UNITED STATES ARMY APRIL 1968

AVIATION DIGEST

UNITED STATES ARMY AVIATION DIGEST

DIRECTOR OF ARMY AVIATION, ACSFOR DEPARTMENT OF THE ARMY
COL Edwin L. Powell Jr.

COMMANDANT, U. S. ARMY AVIATION SCHOOL
MG Delk M. Oden

ASST COMDT, U. S. ARMY AVIATION SCHOOL
COL M. H. Parson

DIGEST EDITORIAL STAFF
LTC J. R. Dome, Chief
Richard K. Tierney, Editor
William H. Smith
John P. Jones
Diana G. Williams

GRAPHIC ART SUPPORT
Harold G. Linn
Harry A. Pickel
Dorothy L. Crowley
Angela A. Akin

DIRECTOR, U. S. ARMY BOARD FOR AVIATION ACCIDENT RESEARCH
COL Warren R. Williams

USABAAR EDUCATION AND LITERATURE DIV
Pierce L. Wiggin, Chief
William E. Carter
Jack DeLoney
Ted Kontos
Charles Mabius
Patsy Thompson
Mary W. Windham

APRIL 1968 VOLUME 14 NUMBER 4

VIEWS FROM READERS 1

THUNDERSTORMS — Rx FOR DEATH 2
CPT James P. McManamy

THE LIFE OF GOLDFINGER, MAJ Fred H. Hope 4

EGADS! ME AN IP? CPT Phillip V. Branstuder 8

HOLD THAT FELIS TIGRIS, CPT Victor Anderson 10

WHAT WAS I LOOKING AT? CW2 Robert H. Abplanalp 12

BETWEEN A ROCK AND A HARD PLACE, 14
CW2 John F. Vaughan and CW2 James L. McElroy

TOWARD IMPROVED DIRECT FIRE SUPPORT 20
CPT B. E. Byerley and CPT Phillip W. Knight

CHANGING REGULATIONS — THE HARD WAY, 25
MAJ George W. Moses

HOW FAST IS YOUR CROSSCHECK? MAJ Willis L. Manley 28

LOCAL FORUM DISCUSSES AVIATION FOR THE PROVINCES 32
LTC Roger W. Kvernes

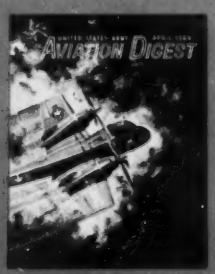
AIRMOBILITY IN EUROPE 35

WATCH A PRO, WETUMSKI! Pierce Wiggin 36

WHY GAS TURBINE ENGINE FAILURES? Ted Kontos 46

PEARL'S 52

ARE YOU BOUND FOR RVN? 64



The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

The DIGEST is an official Department of the Army periodical published monthly under the supervision of the Commandant, U. S. Army Aviation School. Views expressed herein are not necessarily those of Department of the Army or the U. S. Army Aviation School. Photos are U. S. Army unless otherwise specified. Material may be reprinted provided credit is given to the DIGEST and to the author, unless otherwise indicated.

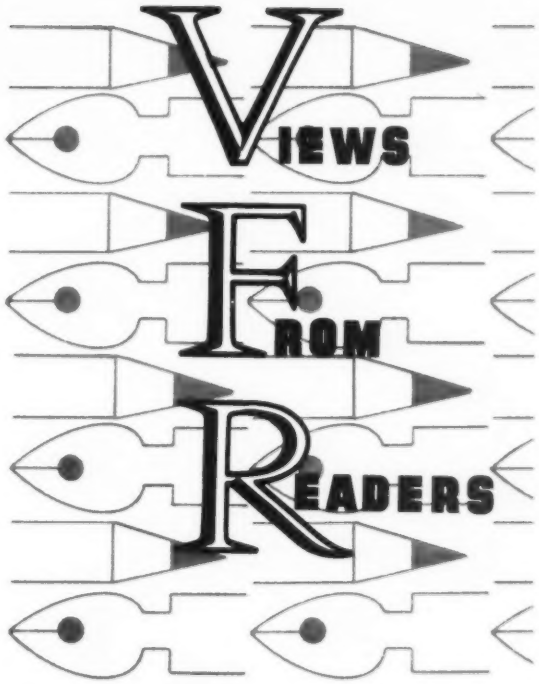
Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, U. S. Army Aviation Digest, Fort Rucker, Ala. 36360.

Use of funds for printing this publication has been approved by Headquarters, Department of the Army, 3 November 1967.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-1. Complete DA Form 12-4 and send directly to CO, AG Publications Center, 2800 Eastern Boulevard, Baltimore, Md. 21220. For any change in distribution requirements, initiate a revised DA Form 12-4.

National Guard and Army Reserve units submit requirements through their State adjutants general and U. S. Army Corps commanders respectively.

For those not eligible for official distribution or who desire personal copies of the DIGEST, paid subscriptions, $4.50 domestic and $5.50 overseas, are available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.



Sir:

Your article on "Cockpit Animosity" [December 1967 DIGEST] caught my eye. It may serve your purpose to point out the inefficiency of antagonism, but if your interest is accident prevention, then heed the words of the pilot at the controls . . . "It is my opinion that because of my poor pilot technique I drove the helicopter into the water." Glaring, calm water gives very few visual cues; depth perception is so poor that almost all seaplane pilots make an instrument landing under glassy water conditions.

Would you believe that under glassy water conditions a pilot might level off at 50 feet and drop in? Or worse, think that he is at 50 feet and land nose low?

We operate amphibious helicopters and firmly believe that instruments are a pilot's best friend, particularly the radio altimeter. Many of our standard operating procedures are keyed to preventing collision with the water.

My credentials for so strong an opinion are 4600 hours total pilot time with over 3000 hours in seaplanes and amphibians and 1300 hours in helicopters.

CDR B. A. HOYLAND
U. S. Coast Guard Air Station
Warrenton, Ore. 97146

● *Army aviators are alerted about depth perception problems when operating over smooth surfaces, such as water and snow. Unfortunately, radio altimeters are not part of the standard instrumentation for Army helicopters. Commander Hoyland's credentials speak for themselves and we would greatly appreciate an article on this subject, based on his experience.—The Editors*

Sir:

This letter is in reference to the article in the October issue of the Aviation Digest entitled "Body Armor and Fragmentation Wounds." In this article the author points out some very serious deficiencies in body armor but fails to come up with a workable solution to these problems. The wearing of the flak vest over the body armor is out of the question. It is extremely bulky, impairs your movement to the extent that you are unable to reach across to the radio pedestal, and is extremely uncomfortable. I feel that I have a simple solution to the problem.

I think that the solution to this problem would be to remove the flak protective insert from the flak vest and tape it directly to the armored plate. This makes the armor plate extremely tight in the carrier, however, it will fit. This also eliminates the problems listed above and still provides the aviator with effective shrapnel protection from rounds breaking up on the armor vest. I feel that with USAAVNS's approval the units in RVN would be able to requisition, through normal supply channels, the protective material necessary to perform this modification.

LT ROBERT C. HUTCHISON
61st Assault Helicopter Co
APO San Francisco 96238

● *An improved combination is now being fabricated by Natick Laboratories. Until this is available, present equipment should be worn as designed for maximum protection.—The Editors*

Sir:

After reading "Letters" in the December 1967 issue of the Aviation Digest, I would like to make a comment on MAJ Donald R. Hull's account of a UH-1 ditching in the South China Sea.

I cannot help but wonder if the person who was lost during this ditching could have been saved by using a technique similar to the Air Force procedures.

Ditching procedures were covered thoroughly by Mr. Gerard Bruggink in the May 1967 issue of the Aviation Digest. Mr. Bruggink's theory is that the Air Force procedures may be better than others.

I believe Army aviation should review its ditching procedures and possibly update them in the very near future.

CW3 BOBBY E. RAULSTON
HQ, 10th Combat Avn Bn
APO San Francisco 96377

● *Mr. Bruggink has recently completed a pamphlet on "Emergency Landing and Ditching Techniques in Helicopters." This pamphlet is now being printed and will be distributed in the near future with the USABAAR "Weekly Summary." Anyone wishing to obtain a copy of this pamphlet write to Director, USABAAR, Ft Rucker, Ala. 36360. —The Editors*

Sir:

We can't afford to have a select group. Who would make up this elite group? How could we utilize them? What would we gain by them?

These are a few of the typical questions and statements constantly heard every time the subject of a professional type instructor pilot comes up. It has never ceased to amaze me that there has never been any action taken in this area when so many agree that the end product would be so very beneficial to Army aviation.

Let's pause and examine some of the statements and questions to see whether or not the Army would really gain by adopting a professional instructor pilot program.

We can't afford a select group. Army aviation is becoming a more complex and specialized field with each passing year. To this end, it is almost impossible for an aviator to become a master of all the aircraft in the inventory. He, at best, will become, as the old adage says, "A jack of all trades and a master of none." In our present crisis, the fruit of this statement is the constant shortage of well qualified pilots for the

Continued on page 19

THUNDERSTORMS

--Rx for death

Captain James P. McManamy

HELLO THERE NEW Army aviator. You say you got problems? You say the girl you dated all through flight school just wrote you a letter and said she's eloping with a telephone repairman? And the only person at your graduation was the finance man from the place you bought your new car?

And that new car is on blocks because you can't pay for a new transmission? And your orders for Chinook school were cancelled and you're going to Vietnam on Tuesday? Is that what's troubling you? You say you want to end it all? Don't be crude; do it the modern way—by going against one of my thunderstorms.

Look, I got a lot of satisfied customers. Like the captain of a 720B I once got. I'll admit, it took a little doing, but after I stretched, twisted and pounded that airplane, it had to fall apart in the air. I mean, if I give it over 3 negative g's and over 6,000 feet per minute climb rates, I can just sit back and relax as the rivets pop out and the wings collapse.

Now mind you, I got a good product. I can tailor it to your needs. That 720B skipper got it at around 20,000, but I can do a good job from the ground up to 60,000. Let's see, you drive a helicopter. Hmm, I have just the thing for you. I obliged a DC-3 pilot with it. He was supposed to buy the farm, but I let him go because he complained about my prices. Here's what he said—

"A severe updraft was encountered which brought the nose up to the vertical position in spite of full forward pressure on the yoke. The plane continued on over until it was on its back, at which time the yoke was pulled to the full backward position to recover. For the next 20 seconds normal flight was maintained at 3,000 feet, but again a severe updraft was encountered and a loop was again made, recovering at 3,000 feet.

"Following this, the aircraft rolled over on its back and made a half loop; then it was thrown on its left side. At 1,500 feet MSL the ground was sighted—only about 200 feet below the aircraft. Some altitude was gained but another loop occurred, and the aircraft broke out of the overcast in a vertical dive with an airspeed of around 240 miles per hour. It required strenuous efforts on the part of the crew to avoid striking the ground. Following this, conditions were normal and the flight continued to Charleston and landed."

You see, that would be perfect for you because, I mean—well, it's spectacular! If you want to go baby, go out in style—on your back in a helicopter. Zowie!

Now you might not like that kind because you can see it coming. I have just the thing for you. Perfect. You don't see it coming and when it gets you, BLAM! That's it. I call it my Prefrontal Blockbuster. It's just great.

I got this BAC-111 last year. The captain had all those fancy radar devices and stuff, and he was flying at the same altitude you chopper people fly — around 4,000-5,000 feet. I painted a nice picture on his radar. I gave him a couple of areas of heavy precip and a nice light area to turn to. Aha, trapped! I had a beautiful wind shear line waiting for him and—CRUNCH! I snapped off his T-tail. This was just great because it wasn't on his radar and he was still 10 miles from the clouds of the squall line. I was waiting for

CPT McManamy wrote his fiction article, "Thunderstorms — Rx for Death," since weather is the greatest single cause of fatal aviation accidents. He is a rated instructor pilot and currently is assigned to the Aviation School at Fort Rucker.

another customer that night but he chickened out and landed.

I got another deal for you. It's called my Elevator Special. It works just like an elevator with one direction—down. First, you gotta get under one of my big black clouds. And you have to pick the right time. If you're too early, you'll get some nice updrafts. You should wait until we got things going pretty good inside. You know, like many cells baby. The signal will be some rain coming out.

Once these cells are going we get some great downdrafts—up to 2,000-3,000 feet per minute. I'll tell you how we do it; it's no big secret. We just get some unstable air that's got some moisture in it and lift it up by either heating it or pushing it up a mountain or by using a front until it keeps going up by itself because it's hotter than the air around it. It keeps going until the moisture condenses into water droplets and heat is released. The water starts down real fast and pulls some air with it. So you got a downdraft and you got to have air to replace it, so you got updrafts too.

Simple, man. You got a bunch of this air moving up and down and you got action! You get underneath one of these babies and it's going to push you flat toward the ground. We like for you to try to pick a spot where the cloud is pretty close to the ground to go under. You see, that makes my job easier and gives me 100 percent results. You get under, start losing altitude, and then point the nose of the chopper into its best climb attitude and pull in the power till the rpm bleeds off. Then just sit back and enjoy the view—of the ground—coming up fast.

Well, that's about all I have to offer. Like I say, you make a deal with me and fly like I told you and I'll guarantee the results.

OK, you say you don't want to do business with me? Competition. Always competition. Tell me who it is. Is it Poor Preflight or Low-Level Showoff? Tell me, I'll match their price.

Well, I might want to do business with you anyway. I get so much pleasure out of it, I'll do it for free, bumpke.

The Life Of Goldfinger

Major Fred H. Hope

DURING THE summer months of 1965 an aircraft was born deep within the walls of a building in Morton, Pa. This building belonged to the Boeing Aircraft Company and this child was destined to become a CH-47A, a giant among aircraft in the Army aviation family.

In the ensuing months one could see this budding infant grow until finally 65-8007 was ready to leave the warm and loving house of Boeing and look for a job. This job would probably be quite similar to those found by his older brothers and would be for a firm known as the United States Army.

Now "007" might be chosen for one of three positions. First, he could be sent to one of the Army's test facilities, but this was very unlikely. The second job that might be selected for this giant would be to go to Fort Rucker and be a training aid for fledgling Army aviators who have just received their wings. Now 007 didn't relish the idea of such an assignment, because he had older brothers who had drawn this assignment and they talked "of long, hard hours and some rough treatment each time a new group of aviators came to the Department of Rotary Wing for CH-47 training." The third and last choice of an assignment for 007 was to go to New Cumberland Army Depot for additional preparation for an eventual assignment to Vietnam with a deploying unit. This was the choice for 007, and he held his head high, for this was the final test for all "good Chinooks."

So it was that 007 went away to "New Cumberland Army Finishing School" in preparation for the newly selected occupation. At New

---

MAJ Hope was a member of the 180th in Vietnam at the time he wrote his article on 007. The unit was first formed in May 1966; he joined it in June and accompanied it to Vietnam. 007 was a favorite aircraft of the unit, according to Hope, who said this was why he chose it as a topic to write about.

Cumberland many things were changed. 007 received many modifications, such as additional radios for communication with his brothers and ground stations, Decca navigation equipment to enhance his ability to find his way in strange terrain, and armor plating to ward off punches aimed at his vital components. After several months of such preparation 007 was ready to take his place as a giant among giants.

Down in Georgia, at a place known to many as Fort Benning, a newly activated aviation unit had been organized and was being equipped with Chinooks before deploying to the Republic of Vietnam. In June of 1966 a group of men traveled from Fort Benning to New Cumberland and after inspecting 007 headed him on his way south. They covered the rolling plains of southern Pennsylvania, crossed the Nation's Capitol, and finally stopped at the one time capitol of the Confederacy in Virginia so that 007 might rest and take a long drink of JP-4, for he was a thirsty giant as all his brothers.

From there they flew over the wooded hills of North Carolina and the sandy, flat lands of South Carlina before stopping again on the banks of the Savannah River at the old southern town of Augusta, Ga. After another long drink, 007 was ready to complete his journey to Fort Benning and become a full-fledged member of the 180th Aviation Company. This trip had been a wonderful experience for 007 for he had discovered the beauty of flying above the trees, rivers, and lakes and he loved it.

At Fort Benning he had to undergo some of the rigors of training aviators new to the game of flying Chinooks, but 007 didn't mind, for this was all in the day's work of preparing the unit to assume its role in Vietnam. He proudly suffered the dust and sand, the tensions and stresses of confined areas and loads, and the occasional rough landing. But little did he realize that this was only the beginning.

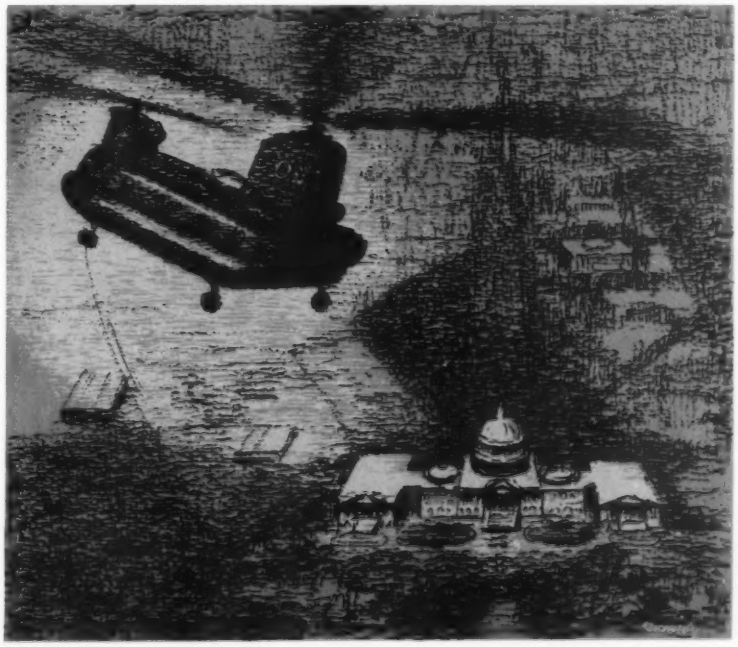
August was a hot, sultry month in middle Georgia and it was now time for 007 and 15 of his brothers to go to California to be loaded on an aircraft carrier for a late summer cruise to the South Pacific and on into the South China Sea. The trip to the West Coast was a long, hot journey, but 007 proudly made the trip. Across Alabama, Mississippi, Louisiana, Texas, New Mexico, Arizona, and finally California the caravan traveled, eventually arriving at Alameda Naval Air Station. At Alameda he had his blades removed and was fitted with a protective jacket for the South Pacific cruise.

Setting sail on 4 October, he enjoyed six weeks at sea and arrived at Vung Tau, Vietnam, on 15 November. At this point he was readied for flight once more and he and his brothers were flown to Dong Ba Thin. It did not appear that flying in Vietnam was going to be a great deal unlike flying in the United States. Both have mountains, valleys, and plains. 007 marveled at the beauty of Vietnam with its mountains, plateaus, and white sandy beaches bordering the blue waters of the South China Sea.

007 took to the task of supporting the ground forces in Vietnam with gusto. He continually hauled varied loads of howitzers, gun crews, infantrymen, rations, fuel and ammunition. The weather was cool so the heavy loads didn't seem to bother 007. He would just gather the cool, crisp, dense air into his huge rotor blades and fly merrily on his way.

He supported units from Phan Thiet to the south on the coast and at sea level all the way to Kontum in the central highlands. There never seemed to be any doubt that

En route, Goldfinger passed near the Nation's capitol



Goldfinger marveled at the beauty of Vietnam's countryside and seashore

he could carry a tremendous load to any place at anytime.

The aviators all enjoyed flying this jolly giant because they associated his name 007 with such notables as Sean Connery, secret agent 007, and Pussy Galore, the partner in crime of the infamous "Goldfinger." So it was that in due time the crew and aviators who flew 007 started to refer to him as "Goldfinger." When the towers and radio facilities were contacted, the call sign was always "Double-O-Seven." Affectionately though his name remained Goldfinger and eventually his shoulders were emblazoned with an emblem symbolic of his nickname.

Time passes and soon it is early February 1967. The days are longer and the temperatures in midafternoon are starting to rise. It seems that the rains associated with the monsoons along the coastal area of Nha Trang and Cam Ranh Bay are about to be over for a few months. For this reason the aviators who fly Goldfinger and his brothers are rejoicing and are somewhat relaxed when flying because they have greater visibility and flying is just a lot more enjoyable.

Late one evening, word is received that there is going to be a big operation over in the highlands where the field elevation is about 2,800 feet. Elaborate plans are made and Goldfinger and seven of his brothers are made ready to help as they can.

Early the next morning they all depart and arrive in the area of operations. It is going to be a busy day. Artillery units are to be moved along with tons and tons of supplies. The infantry must be moved and it seems that it all must be moved at the same time. For this reason it is decided that 007 will assist the Hueys in moving the infantry into position.

It is a beautiful day with blue skies and puffy white clouds. Light breezes are blowing and the temperature is rising quite rapidly during the early afternoon because the sun's rays are not broken by the sparse cloud cover. Throughout the area several Hueys have strained very hard to take off with heavy loads and then have just given up and fallen back to the ground. There they lay, all crumpled and looking sick. Their legs are bent outward until they are almost horizontal, and their tails bent downward and in some cases broken off completely. Things are happening so rapidly that it is not readily diagnosed why they are becoming ill.

Goldfinger is breathing harder when he lifts the 8,000-pound loads but those about him haven't noticed yet. Being the giant that he is, he has always had two healthy hearts to keep his system functioning when the workload becomes great.

About 1430 hours he is chosen to lift 30 troops and lands in the pick-

up zone. The troops are loaded but there is a slight delay before the ramp is raised. The person controlling the loading has his attention diverted and during this instant additional troops scamper aboard. The total number of passengers rises to 40. Now Goldfinger knows that on a standard day at sea level he can lift his head high and climb with a gross weight of 33,000 pounds. The two aviators decide to give it a try, not knowing that most of these 40 passengers have a case of C-rations per man in addition to all the equipment a trooper normally takes with him on a combat operation. Goldfinger is 800 pounds over maximum gross weight.

Now Goldfinger's rotors are turning at the prescribed 230 rpm and the thrust lever is slowly and smoothly raised by the firm, but gentle, hand of the man at his controls. The torque meter reads 750 pounds, well below the red line, as he climbs to a normal hover. No one notices that the hearts are developing the full percent of power available, so the cyclic is eased forward to initiate a takeoff. Goldfinger lowers his head as if he were a charging bull and strains every muscle within his body, but his rotor blades cannot collect enough of the thin air to really stay airborne.

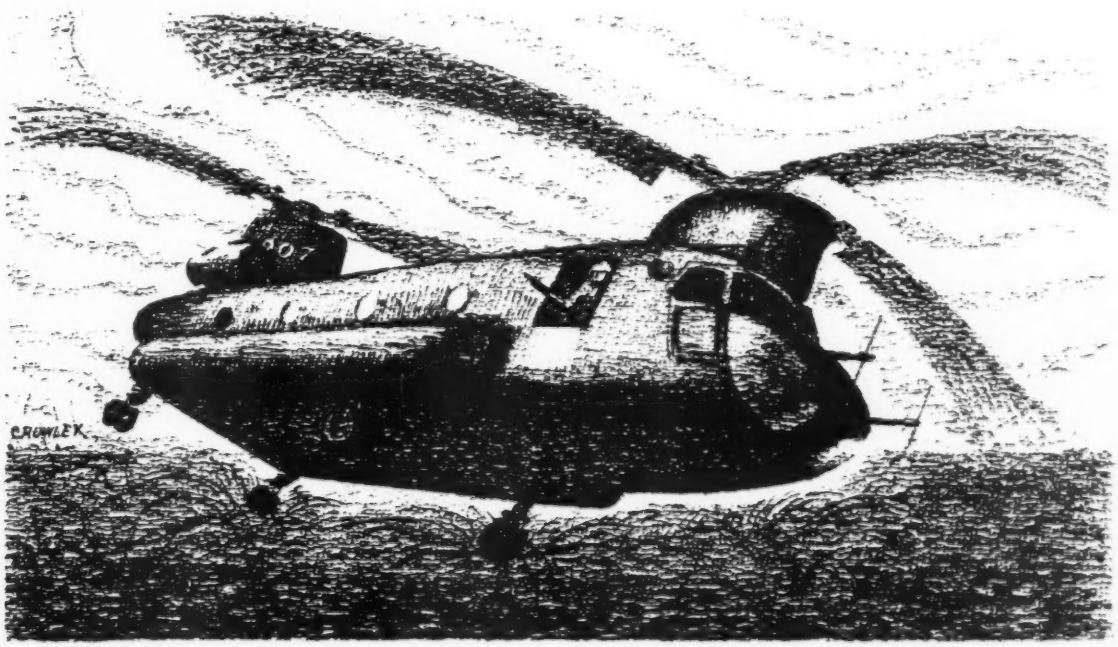
As hard as he tries he cannot maintain 230 rotor rpm. The copilot frantically starts to beep the hearts in an attempt to regain rpm. They already are pumping all the power available into the rotors. The falling rpm cannot be checked, so thrust is reduced in an effort to let 007 regain his composure. This is to no avail, so the best landing area available is selected so that he can sit down and rest. As he approaches the ground he strains every muscle once more and eases himself back onto the side of a hill. Touchdown is very gentle.

This last effort had completely sapped his strength. As he settles down on very insecure footing, he passes out and falls crumpled onto his left side and then rolls over on his back. The landing area is horizontal along the side of a steep hill. In the fall he broke off his rotor blades and the aft pylon, but as he lies there, one of his hearts keeps beating until it is stopped by someone in the cockpit.

Goldfinger and the crew have done a tremendous job during this illness brought on by density altitude, for none of the 40 passengers and five crewmembers are seriously injured.

As this is written it has not yet been determined whether or not he will ever again carry a load, but from his hospital bed he whispers over and over again, "Please be alert to those factors of density altitude and associated maximum gross loads, lest my brothers suffer the same fate."

Approaching the ground, Goldfinger strains every muscle once more



Egads! Me An IP?

Captain Phillip V. Branstuder

WELL, THE LONG awaited day has finally arrived for young WO1 Pitchpuller. He's just left the mail room of his unit in Vietnam carrying a long official envelope from Warrant Officer Assignment Division in Washington —his orders for reassignment.

"Hot dog," he says, "I hope I got the post I asked for." Frantically he tears open the envelope, looks at the contents and lets out an anguished howl.

"Me? assigned me to Fort Wolters? Jumpin' catfish, I've only been rated 9 months. Fly with some clod who never saw a helicopter before? Why I'd be safer here in Vietnam." Sounds a little far-fetched and silly; but, really, this is the prevalent feeling among many young aviators receiving orders to the Bustling Boom Town on the Brazos. I know, for I felt the same way and so did many of my friends in Vietnam.

Needless to say, I arrived at Fort Wolters convinced that I did not possess enough experience to become an instructor pilot. When I reported to the assistant commandant for my initial interview, I lost no time in making him aware of the fact that I had a platform instructor background and would really prefer to work in the academics division.

Actually, at that time I would have taken any job he offered that did not involve sharing the cockpit with a student intent upon shortening my life span. My thoughts were entirely negative to being an instructor pilot when the assistant commandant informed me that the academics division was up to strength so he was assigning me to flight division.

I approached flight division headquarters with only a slight bit less apprehension than if it had been the electric chair. I was introduced to the flight division commander who explained the operations to me. He explained that I would go through a 60-hour MOI course and then be assigned to a flight conducting advanced flight training.

Again, I approached the MOI course with less than an elated

CPT Branstuder based his article, "Egads! Me An IP?" on personal experience and observation while serving as an instructor pilot at Fort Wolters, Texas.

attitude. "Me teach maneuvers in a Hiller? Why good golly, I could barely fly that beast myself in flight school."

After about six hours I was amazed at how much they had improved the machine in the year and a half since I left Wolters. They had certainly improved the throttle and cyclic controls because I could hold the rpm fairly well and wasn't having any trouble hovering the bird. Actually, I wasn't out of the woods yet.

My IP told me, "Now you can fly the aircraft pretty well, so start working on your narrative."

The fun really started then. I was able to fly the aircraft fairly well, and I have never had any trouble talking.

Putting both together brought many anxious moments. While demonstrating autorotations, I would get as far as "at approximately 100 feet, place the throttle in override . . ." then the IP would scream, "I've got it. Darn it, are you trying to kill me?" as he made a frantic power recovery from a vertical descent. After several more hours of this madness, things began to seem natural; I could both talk and fly the aircraft well enough to pass an acceptance checkride in the Hiller.

I will admit that I was somewhat nervous with my first class of students, but by the end of the class I even found that I enjoyed teaching students advanced maneuvers.

Just as I was beginning to enjoy life the ax fell upon my high spirits once again. My flight commander told me, "Go to MOI and get a checkout in the TH-55A." What! Me check out in the Plexiglass Playtoy, the Matell Messerschmitt! Not in that displaced Vacu Form Product.

Again with a lot of negative thinking, I went back to MOI, checking as before, all my personal affairs. I informed my wife where all my life insurance papers were. At one time you see, the TH-55 was notorious for turning straight-in autorotations into straight-in forced landings due to engine failures. This was because of a minor mechanical difficulty that had been repaired by the time I checked out in the bird.

I wasn't convinced, even when an IP led me through the preflight and runup. After about 30 minutes, I came out of my state of shock enough to realize this was really a sweet machine to fly. Now after almost a year of alternating between the Hiller and the Hughes each class, I have no real preference.

Each machine has its own advantages and limitations. I can truthfully say that I and most of the others who approached our assignment to Fort Wolters with worry and uncertainty really enjoy our assignment.

There are probably better assignments in the Army (such as technical advisor to Hefner's Bunnies preparing for a Viet-trip), but at Wolters we of the flight division really feel gratified when each class graduates and we know we had a part in the instruction. Almost anyone who flies well enough to survive a tour in Vietnam has the ability to teach these students. Furthermore he has the added advantage of being able to relate this primary phase of training to a combat experience.

So, Mr. Aviator, don't feel bad when you get your orders to Fort Wolters. I really believe you will actually like this job of teaching the young students to fly enough to look forward to the next day's challenge.

There are probably better assignments in the Army, such as technical advisor to Bunnies going to Vietnam

Hold That Felis Tigris

"Tiger" has become a mark of honor. Some of those "honorable" creatures can be found flying Army aircraft

Captain Victor Anderson

PADDING DOWN a trail in the lush green jungles of Assam, the tiger is a beautiful picture of feline grace. Its every movement stirs within man the desire to glide through space with such artistry. When man does achieve some degree of this form through a Nureyev or Tallchief, wide acclaim and fame are his to command.

But the tiger, an unpredictable animal, comes in more than one form. Man, the tiger's mortal enemy, has revered him for his courage. To the fierce person, willing to extend himself beyond the normal limitations of any given exercise, the appellation "Tiger" has become a mark of honor. Some of these tigers can be found among the creatures homo sapien who ply their trade flying U. S. Army aircraft.

This group cannot be easily identified by visual appearance. They wear the same green flight suit and file the same 175s. They are set off from their fellow aviators not by their desire to accomplish the mission, but rather by their modus operandi and willingness to "stretch it a bit." Their attitude becomes an affliction that allows an otherwise moderate aviator to bare his claws to accomplish a mission.

Grand fortune smiles on the Army aviator, for generally he flies forgiving aircraft. He does things with his O-1 and OH-13 that would make high performance jockeys turn mauve. He learns to make his aircraft perform to the zenith of its capability. He works at his task diligently and becomes a necessary and vital tool of the U. S. Army. His opinion and advice on aviation matters are sought by the ground commander.

It is here, at the very juncture where responsibility should become paramount, that the possibility of the tiger emerges. The desire to excel is a strong one. Combine this with the desire to sell Army aviation and show a job well done. Gently blend these ingredients with a natural tendency of not wishing to say "No" to a superior and you have the possibility of a roaring tiger.

Why should this attitude be found in Army aviation when the "hottest" thing we fly cannot keep up with basic trainers used by other services? The answer may go back to the romantic days of World War II when fearless aviators took to the skies in trusty L-4s to do battle with everything from -88s to Messerschmitts. Armed with no more than a belly full of guts and a tongue to stick out at the enemy, they made the wings of Army aviation a proud emblem on anyone's chest.

Korea found the H-13, and medevac grew into Dustoff in Vietnam. Did these aviators stretch it a bit? They surely did. And a lot of them stretched it into dying. But it was stretched under conditions that called for an extra effort at a time when hard professionalism had to be attenuated by necessity for survival. These aviators were trained and reared as professionals. Their professionalism carried them into the war and only the exigencies of combat diluted their flying discipline.

"Only the exigencies of combat . . . flying discipline"—these are items that the tiger sometimes forgets in the everyday performance of his duty. Let me reset the scene for a one act play I am sure you have all seen.

It is late Friday afternoon and dusk is closing in. The aircraft are all tied down and Happy Hour is in full swing. Casting furtive glances about the bar, a tiger lurks, hoping

---

CPT Anderson, a senior aviator, selected his topic for "Felis Tigris" because of a deep and abiding concern for safety. While he readily admits what may not be safe while flying in noncombat situations may have to be accomplished in combat, he encourages being as safe as is possible under the limitations imposed upon us.

to snare some unsuspecting prey. The lunge is made to the accompaniment of part of his third martini spilling down the front of his prey's fatigues. But now he has his victim firmly held by a previously usable left arm. He opens his mouth to talk:

"Bobby boy, you should have been with me yesterday. Man, was it grim. You know I told you about trying to get Colonel Wills to use Army aviation. Man, did I give him a bellyful yesterday. You know that little field strip north of Casper City? You know, the one with the red barn on it. Anyway, the battalion's up there on an exercise and the colonel comes up to me and says that he just has to make it back to post last night for a dance.

"Well, let me tell you, that old Bird Dog is a sweetheart. The weather was 200 scattered, 500 broken, 800 overcast with a quarter mile vis in freezing drizzle. Man, you know how well I know the country between here and there. Well, I cranked up the old O-1 and made with the program. I swear we must have spent half the time inverted dodging fence posts and anthills. Don't know how I did it but managed my way in with minutes to spare. Must have had at least an inch of ice on my leading edges. And the old colonel was so glad to get here he said it was all right for me to stay here and he'd take a jeep back in the morning. How's that sound, buddy —pretty hairy?"

You bet it sounds pretty hairy. Not only has he lost one colonel to Army aviation, but he has endangered two lives, one airplane, and anything that might have been under his flight path. That's not so bad, you say. After all, he did accomplish his mission. Everyone's safe and the colonel ought to be thankful he made the dance. Right? Wrong! Unfortunately, dead wrong.

Think of all the accident reports that are the only testimony to an unsuccessful flight. Think of the tigers who will never again be able to tell their stories at the bar. And even if you can be cynical enough to pen their epitaphs as, "They should have known better," what about those souls they took with them? People who looked at the wings on their chests and accepted them as professionals.

No, there is no room for tigers in the air. There is only room for the professional who can be relied upon: a man who gives a steady competent performance at all times, and one who has the ability to perform with an extra devotion to duty under the hardship and duress of combat. While we train and perform within the confines of a civilized society, let us keep our tigers in their cages.

What Was I Looking At?

He passed 50 feet above me and I don't think he ever saw me

CW2 Robert H. Abplanalp

IT'S A SAFE bet to assume that a large share of the DA Form 2696, SHARE-ITS, on file are in-flight near-miss reports.

I am not talking about those IFR, under radar control, near-misses where you catch a terrifying glimpse between clouds. That's a job for the air traffic control experts.

Let's confine our discussion to those sunny, visibility unlimited, not a cloud in the sky VFR thrillers. They all read much the same, "The other aircraft passed 50 feet above me and I don't think the other pilot ever saw my aircraft." Of course, the easy answer is to say the other pilot wasn't watching where he was going and blame it on him. However, it takes two to tango, and only a fool would let another aircraft come sailing out of the wild blue yonder and pass within 50 feet of his own aircraft without doing some evasive maneuver to widen the distance. Which leads us to the real question we should ask ourselves, WHAT WAS I LOOKING AT? In other words, how did he get that close without being seen?

Could be we had our heads in the cockpit. The cockpits of Army aircraft leave much to be desired in arrangement and standardization. We have all kinds, sizes and shapes

---

CW2 Abplanalp selected his theme of "near-miss" incidents because of the possible midair collisions that could replace the more fortunate near-misses and his personal observations of the frequency of such incidents. Currently CW2 Abplanalp is serving with the Department of Tactics at the Aviation School.

of gauges, lights and switches that we push, pull, turn or just look at and wonder about. Radios—well if it's ever been in the Army inventory we have it in a cockpit somewhere. Then there is that cute little intercom control box: every time you care to change transmitters you have to let go of a control to select the proper transmitter (unless you care to chance getting the wrong one).

Have you ever played hide and go seek with the aircraft instruments? You know, the one that used to be right there, where that big hole or cover plate is. Then, of course, to add to the confusion we have those aircraft that have been subject to months of "write it down on the instrument panel." You know, the stuff in grease pencil and green tape that you are never quite sure whether it's a phone number, warning, or a complete SOI. But let's face it, nonstandard, messy cockpits are going to be with us a long time. Uncle just doesn't have the loot to throw the stuff away and make everything the same.

So the aviator must be not only current but also proficient in the model and type aircraft, as well as be aware of the substitutions and modifications maintenance makes in our airborne office. If you are not, you can't rely on habit and feel to be sure you've got the right gauge or switch. You'll have to interrupt your normal scan and crosscheck and look for it—which means it takes more time, more time with your head in the cockpit.

Yup, you guessed it; while you are looking around this strange cockpit, "Out of the corner of my eye, I caught sight of an aircraft on a collision course. I made a hard right turn and the other aircraft made a hard left turn. We missed each other by 10 feet."

As long as we're talking about head in the cockpit and pilots' crosscheck, scan, etc., we might as well mention VFR attitude, by-the-seat-of-your-pants flying. We all know about those big airline types and high performance stuff that do almost everything from takeoff to landing without looking out the windshield. Sure, Army aviators and aircraft can and do fly on the gauges, but let's face it, 90 percent of our flying is good old VFR seat-of-the-pants, nose-on-the-horizon, attitude type flying.

Remember way back in flight school when your instructor told you all about attitude flying—you know, the position of the nose, tops of the doors, etc., with reference to the horizon? And the importance of flying the aircraft by attitude and using the instruments as a crosscheck? Sure it is important to fly at specified altitudes and airspeed and make turns with that old ball smack in the center. But let's be realistic, if the best you can do by attitude flying with the old eyeballs looking outside the aircraft is 990 feet and 78 knots with the ball a hairline off center, it's a darn sight better than dying in a midair at exactly 1,000 feet 80 knots and the ball smack in the center.

When is the last time you checked your crosscheck? Your crosscheck could be a little slow or performed at the wrong time. You just might be doing more instrument flying than attitude flying. Get a buddy to check you out. You might be surprised.

Speaking of buddies, what about team work in the cockpit? Put your stick buddy to work. Use his eyes and skills. Let him be the navigator and radio man. Lighten your workload so you can spend more time with the eyeballs looking out on yonder horizon. Remember though, be professional about it; you have to be specific on his duties because you are still responsible.

Ever fly with one of those wallpaper hangers? You know, the guy you ask to get out the map and he unfolds all 6 sheets of 1:50,000 all over the windshield, instrument panel and your lap. You should have spotted that wad of paper before takeoff. That's right, you have to have a flight briefing and be specific about who will do what and how. Could be he is your best buddy, but that's no reason to let him endanger your life. And just in case you don't know how to fold a map, FM 21-26 has a couple of good examples that keeps it neat, small and usable. The whole point is to keep your cockpit and workload neat, organized, to prevent cockpit confusion so you'll have more time to look around.

While you are looking around, are you really looking or just sweeping the sky? The flight surgeon will tell you that it's a common misconception that the eye sees everything within its field of view. It just ain't true. You see best in daylight and the eye sees by moving in short jumps. It's not a sweeping but a jerking motion with which you see details around you. This is of utmost importance to an aviator scanning the sky for other aircraft.

The eye sees only when it pauses and fixes an object on its retina. In scanning the sky do not deceive yourself that you have covered an area with a wide sweeping glance. The correct way to scan is to cover an area with short regularly spaced movements of the eye. It's important to develop a scanning pattern to really see what you're looking for.

So, before you end up filing a near-miss report or having a midair, ask yourself, WHAT WAS I LOOKING AT? Just maybe you might find something that is preventing you from seeing another aircraft in time to extend the courtesy of the sky. You know, the rules that say when another aircraft has the right-of-way I will give way to that aircraft and may not pass over, under or ahead of it unless well clear.

I'LL RUN FOR A MULE.
PLAY-DAY
MARCH 1968

The wrong manuals may leave you like Ace —

Between a Rock and a Hard Place

CW2 John F. Vaughan and CW2 James L. McElroy

WARRANT OFFICER Ace Onbase was three miles from the battalion command post as he looked out and took in the breath-taking view. He could see 20—no, maybe 30—miles in any direction from his 1,000 foot altitude in this wonderful little machine, the OH-13G. My, he thought to himself, those weather people sure were right! CAVU, that was what they had forecast this morning when he checked the weather. Surely this was a wonderful day for flying.

Warrant Officer Ace Onbase was three months out of flight school and had been fortunate to get a stateside assignment. Probably because he was so good with the OH-13. That was why they had assigned him this mission of picking up the battalion commander this morning. Even though he only had 35 hours in the OH-13, there just wasn't anything that he couldn't make the little Sioux do. Only yesterday he had delivered three cases of C rations to a squad in a confined area about 40 by 100 feet long.

As he thought of this mission a rather smirky smile crossed his face. It couldn't have been anything but his outstanding flying ability that got him out of that area! Who else could have cleared those 100-foot pine trees with 2700 rpm and 28" manifold pressure? As he thought of this another thought flashed across his mind—Why did somebody say that the OH-13 was only allowed a 200 rpm drop on each magneto? That mission yesterday proved beyond a doubt that the story wasn't true! Hadn't he checked the mags and found a 450 rpm drop on the right magneto? Of course there hadn't been anything to worry about. There were two magnetos for the engine!

Suddenly Mister Ace Onbase realized that during all of these deep thoughts he had flown about one-quarter of a mile past the command post! Why not make a 360° overhead approach and impress the battalion commander? Sure—that would look as if he had planned it this way.

Smoothly he lowered the collective pitch, trimmed the right pedal and rolled into a tight left autorotative turn, perfectly coordinated as always. Ace had completed 180° of the turn and moved the cyclic—what is this? The cyclic appeared to be stuck!

I will have to use a little force, Ace said to himself. The cyclic won't budge! Now what? he thought, as the altimeter was unwinding like a runaway clock!

He caught a glimpse of the battalion commander out of the corner of his eye. Why had he dropped his briefcase and why was he running away from the landing pad? My goodness! he must stay inside most of the time. Just look at that sickly pale green color of his face!

Quickly Mister Ace Onbase got back to the chore at hand. I have to add power, he thought just as the left skid contacted the ground and collapsed.

At this point Ace seemed to recall that somebody had said that in event of an unforeseen or unavoidable incident the best thing to do was to pull the mixture and cut off the ignition and battery switches. Still keeping that same cool head, Ace cut all switches and pulled the mixture.

What a disgusting sound that rotor blade was making as it struck the ground! And that plexiglass bubble ripping apart was sickening! It sounded like someone ripping up an old bed sheet.. What is that putrid odor, fuel and oil burning? Boy! I better get out of this mess! It sure is a good thing I only fastened my lap belt. That shoulder harness might have gotten tangled up. All these thoughts ran through his mind as Ace jumped off the right skid to the ground.

Someone was shouting, "Get

CW2s Vaughan and McElroy chose the OH-13 as a topic for their article because of their familiarity with that aircraft. CW2 Vaughan spent 2 years as an OH-13 maintenance officer and saw the situation described in the article simulated. CW2 McElroy served for 20 months as an IP in OH-13s. Vaughan currently is in Vietnam and McElroy has re-entered civilian life to fly for the U. S. Army Map Service in Africa.

away from there before it blows up!" Ace looked around as he started to run and saw it was that same lieutenant colonel with the pale green complexion. Maybe this was to have been a medical evacuation mission from the looks of that guy.

"Are you all right Mister Onbase?" the colonel asked between each gasp for breath.

"'Yes sir!" replied Ace as he thought again that this colonel sure must not ever get any sun or that he must be suffering from some illness he picked up somewhere.

"Sir, we have alerted Crash Rescue and the safety officer!" Captain Paperwork said as he arrived on the scene. "What happened, Onbase?"

"Well sir, it was like this—"

At this point in our story let us leave the scene of the accident and go back about two hours in time . . .

Mister Ace Onbase had felt extremely well as he drove up to the flight line this morning in his new Super X-93 sports roadster, despite the fact that he had stayed up until 2:30 in the morning reading all of the manuals that came with the roadster. What a machine! This little buggy could go from 0-90 in 6.1835291 seconds flat. That figure had taken considerable effort to come up with, but Ace had been persistent and arrived at the answer after 2½ hours, three pencils, and one complete stenographer's notebook full of figures.

What an engine! Each part machined to within .0000100 of an inch tolerance. Each head bolt torqued to exactly 159.5 inch-pounds. Uses Texaestron 100+ octane fuel; nothing else will do. Engine rpm must not exceed 2000 rpm in first gear.

There sure wasn't anything he didn't know about his shiny new car, Ace was thinking as he walked up to the OH-13 and greeted the crewchief. (Crewchief? This wasn't SP4 Goodguy!)

The cyclic was stuck and as Onbase approached the ground in an unusual attitude his waiting passenger

"Private Oatmeal, where is SP4 Goodguy this morning?"

"Well sir, Goodguy had to go on guard this morning to replace someone who was sick. The first sergeant called the motor pool and told me to get up here on the double since I was the only one around with a maintenance MOS," answered Private Oatmeal.

"Do you normally work in the motor pool, Oatmeal?"

"Yes sir, I have been there for four months, ever since I was assigned here from school!"

Well it doesn't matter, Ace thought as he started around the Sioux to make his preflight. Goodguy always has a sharp helicopter.

Ace climbed up on the engine basket to check the upper flight controls. As he was checking the upper lateral bellcrank bolt, he noticed that it would turn very freely.

"Oatmeal, I think this bolt is too loose. How about looking at it?"

Private Oatmeal climbed up, looked at the bolt and he too thought that it was loose.

"No sweat, sir. I'll get a couple of wrenches and tighten it."

Oatmeal jumped down and was back in a flash tightening the bolt. There isn't much to this aircraft business, he thought. Just like working on those 2½ ton trucks. I'll just tightened this bolt up about three clicks of the elbow and let Mister Onbase be on his way. What is this cotter pin doing in here? That bolt won't come loose, not as tight as I have it. I had better put it back in though. It won't go—maybe I can tighten it one more castellation and it will fit. There! That does it.

"OK, sir, you are ready to go now. The bolt don't turn any more."

Ace rechecked the bolt. Sure enough it didn't turn. Why have they got this guy in the motor pool? He certainly seems to know what he is doing.

DROPPED HIS BRIEFCASE AND RAN

Ace had taken more time than he had planned on, so he decided to make an abbreviated runup. After all, had he ever found anything of importance on runup before?

Here we change the scene and time again and return to the scene of the accident.

"Sergeant Meticulous, you and your team start going over the wreckage while Captain Missnothing and I question the witness," ordered Major Bythebook, president of the accident investigation board.

"Now, Ace, when did you first notice anything out of the ordinary?" asked the major.

"Well sir, as soon as I realized the Sioux was not going to come out of the left turn, I knew something was wrong with the aircraft."

"Had you experienced any control malfunction before this time?"

"No sir!"

"Now, Ace, I want you to go over everything from the very beginning. Start with your preflight and go right up to the time of the accident."

"Well sir, I arrived at the flight line at 0700. I know that was the right time because I checked the clock on my new Super X-93 sports roadster. Boy, that is a fine machine. Sir, did you know that car will—"

"Onbase! I don't care about your car! I just want to know the facts about this accident. Now if you don't mind, *please* continue with your story."

"Yes sir," said Ace, somewhat shaken at the major's tone of voice. It looks like he could speak more softly. After all, haven't I just had a horrible experience because of someone else's carelessness. "Well I started my preflight by talking to Private Oatmeal. You see Oatmeal wasn't the regularly assigned crewchief, and I wanted him to feel at ease. The preflight was routine except for a loose bolt on

The preflight was fine except for a loose bolt

the upper lateral bellcrank but Private Oatmeal tightened that and I rechecked it myself. It was tight. Yes sir, there is no doubt in my mind; he had it tight and the cotter pin had been reinstalled, *for safety* you know," said Ace, for by now he had regained his composure.

"What bolt did you say, Ace?" asked the major who appeared to take a great interest when Ace had mentioned a loose bolt.

"It was the upper lateral bellcrank, sir," replied Ace who for the life of him didn't see what difference that made. He had checked for himself and that bolt was all right.

"Sergeant Meticulous, look at the upper lateral bellcrank and see if there is anything unusual about it," shouted the major.

"Sir, I don't think we can see that bolt. The left fuel tank has collapsed and is covering that general area. We will have to get a wrecker in here to raise the wreckage upright."

"Very well, I'll send Captain Missnothing to call for a wrecker. You and your crew continue your investigation," said Major Bythebook.

You as a reader have probably already guessed the outcome of the accident board's investigation!

The board decided that the upper bellcrank bolt had been torqued so tight that the mounting had been crushed, causing the lateral cyclic control to bind when it was moved to the left. Warrant Officer Ace Onbase had been able to fly to his destination without noticing it because of two reasons: (1) He had been in a hurry and he had not executed a proper runup according to details outlined in the -10. (2) The command post was 15 miles in almost a direct line from where his helicopter had been parked, so Mister Onbase had not made any turns at all until such time as he arrived over his destination.

So now we come to the final conclusion of the board: the most probable cause was supervisory error! Well you say you could have told us that in the beginning, but where exactly does the fault lie?

How about Private Oatmeal? Mister Onbase? How about the first sergeant who sent Oatmeal to the flight line?

The responsibility lies with WO Ace Onbase! Ace should have asked for a technical inspector to look at the retorquing of the bolt.

True, more people were involved, but how many times have you been in Ace's shoes?

The picture we have given here of WO Ace Onbase may appear a little slanted, but there are people walking around wearing wings who could certainly fill Ace's shoes. Where do you find them? Look in some of the backrooms of operation shacks. How many have you ever found reading an "entertaining" magazine or figuring statistics on poker games? Many of these people can give you all of the vital statistics on their car or favorite pinup girl but couldn't even hazard a guess as to which side of the OH-13 engine the right magneto is on.

In the last few years the Army aviation program has accelerated at such a fast pace that the experience level in the field has not kept up with it. The days are gone, if there ever was such a thing, when we can rely entirely on the crewchief to keep his aircraft in an airworthy condition. Not that our maintenance people are unreliable, but just like in our story, so much training and other details exist that many times we find ourselves in Ace's shoes and hear these familiar words: "I'm not the regular crewchief, sir."

If we as aviators don't keep ourselves up to date on basic maintenance procedures and check on the latest maintenance manuals we may find ourselves in the same place as Ace—between a rock and a hard place!

VFR

continued from page 1

Chinook, the armed helicopter, the aerial rocket ships and the recovery and medical evacuation teams, just to mention a few. (I am not qualified in fixed wing aircraft, so my remarks will pertain to rotary wing. I believe, though, that the thoughts presented in this letter would be apropos to the fixed wing field of Army aviation, also.)

To meet the demands of this problem area, we truly need the best qualified individuals available to teach the various aspects of each specialized field. You can't buy nor issue experience, but you can learn, teach and gain from it. So we can and should afford a select group.

Who would make up this elite group? How could we utilize them? First and most important, we should develop a positive system of projecting an individual's potential for this particular field of endeavor. As soon as a student begins demonstrating a true ability to perform in an above average manner, the instructor should present the student's potential so as to have him observed and evaluated throughout his flight training and in his future assignment. Based upon these reports over a period of time, Department of the Army, having been previously alerted and advised of this individual's potential, should assign him to the Aviation School for instructor training.

Instructors, once selected, trained and assigned to this duty, would perform in their specialized field until thoroughly qualified. Only then would an individual be authorized to broaden out into other special areas. Once an individual is appointed as an instructor pilot, he would remain in this capacity until he either requests to be relieved or demonstrates that he is no longer desirable.

A normal school assignment should be at least 3 years. He could then be assigned to a unit located either stateside or overseas. In any event he would be returned to the school after a maximum of 3 years. This would not create a problem for assignment branch in the Department of the Army but would in reality assist them.

While the instructor is assigned to areas and units other than the school, he would be required to submit to the aviation command periodic reports on various area problems, quality control, standardization and recommendations. In this respect the instructor would never cease instructing or checking on flight performance throughout the world. The school commandant would be constantly kept abreast of his training needs. The Aviation School, in turn, would keep the instructor in the field supplied with the latest trends and doctrine of the aviation command.

What would we gain by them? The return of the instructor to the aviation training command would serve a twofold purpose: to refresh the instructor and to gain from his field experience. The instructor, while away in the field, would have amassed a vast amount of experience and knowledge of the various problem areas. His recommendations while in the field would have been staffed and evaluated and possibly already incorporated in the current teachings by the time he has returned. It would require a minimum amount of refresher training and he would be ready for his productive school assignment.

The Army would gain untold benefits from the fact that they would always have fully qualified, standardized and constantly current and proficient instructor pilots both at the school and in the field around the world. They would have immediate access to expert and objective information, tailored to the needs of the U. S. Army, in every operational area of the world.

It would eliminate the need of rating poorly qualified individuals as an instructor pilot in units because they are senior or good guys. It would give each unit commander a direct connection with the aviation command. The school, in essence, would also have scouts out in the field, constantly evaluating individuals for possible assignment to the aviation command. They would also be monitoring those already marked as potential instructors.

In the day of the dollar, the savings that would be gained by this method is staggering, to say the least. The benefits that would be derived by the U. S. Army is almost limitless. It would aid greatly the major problem area that we have encountered during our present buildup, which is a lack of qualified individuals as instructors to meet the demands. The present policy of assigning individuals to the school as instructors, regardless of their being either qualified to or capable of performing this demanding task, greatly affects the end product--a polished Army aviator. The task of training an individual as an instructor who has only limited flying experience and little or no motivation is extremely difficult and costly. To accomplish an outstanding job under the conditions that exist during a rapid buildup requires a pilot with lots of experience, confidence, motivation and a thorough knowledge of the needs of the Army aviator and aviation in general.

In summary then, it is felt that we can truly see that we can and should develop a select group of individuals who would greatly assist and improve the Army Aviation Program. We could then, in reality, not only save many thousand of dollars, but also generate a training command that would train, monitor and produce the finest possible helicopter pilot in the world.

CW4 WILLIAM L. RUF
Dept of Rotary Wing Tng
Fort Rucker, Ala. 36360

Sir:

I have just finished reading "Here Stands the Warrant" by MAJ Richard H. Marshall. This is one of the best articles I have ever read. This article not only belongs in the Aviation Digest, it belongs to all free men to read.

Every word that Major Marshall wrote I know is true. I know the man he talks about. I have heard this man talk about his fellow aviators and that great thing in a unit called esprit de corps. This man whom the Major talks about has been a lifelong friend of mine. When I was in the hills of Vietnam and the clouds hung low like a blanket of snow, I never for one minute gave up on that "Warrant" to bring us hot chow and water, but the Warrant I speak of did far more than I in Vietnam.

I know this Warrant. I too know that his heart skips a beat when he hears "The Battle Hymn of the Republic." I also know that his heart is heavy at the loss of a comrade. I too am a "chief" but in another field. The way I feel for my country, I owe to this man the Major calls the Warrant. My heart also skips a beat to "The Battle Hymn of the Republic." I owe this to CWO John W. Hiltner — "Here Stands the Warrant."

SSG JAMES RICHARDELLO
4005 Raeford Road
Fayetteville, N. C.

● *This fine letter not only pays tribute to the Army's Warrant officer pilots but in its sincerity and spirit it also pays tribute to those loyal men whom the Warrant supports. —The Editors*

Toward Improved Direct Fire Support

It is essential that the ground commander understand the capabilities and limitations of the armed helicopter fire team

Captain B. E. Byerley and Captain Phillip W. Knight

COMMAND RELATIONSHIP between the ground commander and the fire team leader is a matter of some concern to aviation unit commanders in the Republic of Vietnam. The aviation unit commander wants to ensure that the fire team he sends out to support a ground unit will render that support in a competent, professional manner; he also wants to be certain that his fire team will be used competently and purposefully.

Even with the number of fire teams now in country, there is still a dire shortage and the daily requirement for fire teams far exceeds the supply. Since this shortage exists, it is essential that the ground commander understand the capabilities and limitations of the armed helicopter fire team so that he may be better able to employ them in support of his unit.

Before development of the armed helicopter, it became apparent that some close air support was necessary to provide protection for troop carrying helicopters. In an effort to meet this demand, VNAF (Vietnamese Air Force) A-1 Skyraiders would rendezvous with the helicopter flight, escort it to the vicinity of the landing zone, then dash ahead to prestrike the LZ and remain orbiting overhead while the troops were landed.

Still, this practice left the troop carriers almost completely unsupported when they were most vulnerable to ground fire—on short final for the LZ, while on the ground, and on climbout. It was apparent that the only aircraft capable of effectively supporting a helicopter was another helicopter,

CPTs Byerley and Knight were members of the 197th Armed Helicopter Company in Vietnam at the time they wrote "Toward Improved Direct Fire Support." Currently CPT Byerley is assigned to the Aviation School at Fort Rucker, Ala., and CPT Knight is assigned to the Electronics Command at Fort Monmouth, N. J.

carrying guns instead of troops.

It is an old story, and a tribute to the Army's ingenuity and adaptability, how the original gun company was formed, using the turbine-powered UH-1A helicopter, jury-rigging a gun system, training for a short time, and then entering combat to make history. It is sufficient to say that the UTT (Utility Tactical Transport) test company was instrumental in changing the TOE of every air-mobile company to include one platoon of armed helicopters.

Aside from the successes obtained in performance of the escort role, it became increasingly apparent that the armed helicopter was capable of performing many other missions in support of the troops that had just landed. In those days available artillery was widely dispersed and the best landing zones were not always within an existing artillery fan. Also, air cover by the VNAF was limited and communication was difficult. Many an American advisor found that his inexperienced Vietnamese counterpart had called in an airstrike at the wrong time, on the wrong target, or both. The armed helicopter, however, was there, had the firepower to deliver, and could be controlled effectively by the advisor.

So began the mission of fire support and overhead cover for ground operations. Other mission capabilities that evolved due to the characteristics of the helicopter were overhead cover for convoys; route and area reconnaissance; recon, mark, and prestrike of landing zones; artillery and airstrike adjustment; emergency reaction for hamlets under attack; and, under emergency conditions, radio relay and limited tactical medical evacuation.

Through experience, fire teams become adept in the performance of these missions; however, they

Assaults such as this one of C Company, 1st Battalion (Abn), 327th Infantry are numerous. The daily requirement for fire team support exceeds the supply

are virtually ineffective unless they know the ground situation and have communications with the supported units. It is a maxim that their radios are as important as their guns or, stated another way, "They can't shoot if they can't communicate." Additionally, the fire team is more effective if its use is preplanned, as is supporting artillery or tactical air. Therefore, every ground commander or advisor must know the capabilities and limitations of his supporting fire team and take advantage of the fire team leader, as an expert on the employment of the fire team, if he is to properly and effectively use this support.

Realizing that the fire team can be employed in the same manner as supporting artillery and tactical

air, the ground commander should devote as much effort to planning its use as he does to his other fire support. In this respect, he must consider both tactical employment and logistical support of the fire team. However, before he can efficiently plan for the tactical employment of the fire team, he must know the characteristics and capabilities of the varied weapons systems available for use.

The system most commonly in use is the XM-16 (fig. 1) equipped with four 7.62 mm flexible machineguns, with a combined rate of fire of 2,000-2,200 rounds per minute, and fourteen 2.75" folding fin aerial rockets. In addition to the mounted weapons system, and common to all weapons systems, each doorgunner has an M-60 machinegun, making the total volume of firepower a devastating force.

Next in common use is the XM-3/M-5 system (fig. 2). Commonly called the "Frog," it may be composed of either 150 rounds of 40 mm grenades and 24 rockets or 300 grenades and 14 rockets. This system has proved effective against soft targets from personnel to sampans. The grenade launcher, using a flexible mount, delivers 200-220 rounds per minute with a maximum effective range, as shown in actual combat, of less than 1,500 meters.

The most heavily armed weapons system, the XM-3 (fig. 3) is composed of forty-eight 2.75" rockets and is normally employed against lightly bunkered or lightly armored emplacements. Either this system, which is referred to as the "Hog," or the Frog system may be used in conjunction with a light fire team, making it a heavy fire team.

These weapons systems are constantly under evaluation, and new systems are being introduced into combat units which will better equip the fire team to tailor its support to the tactical situation.

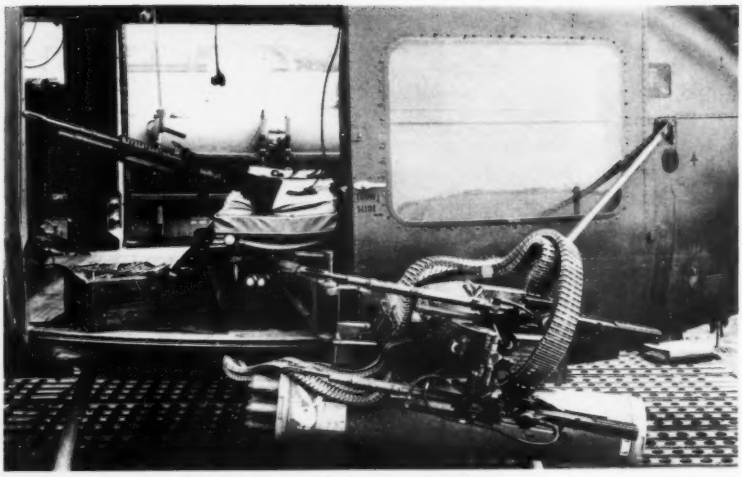
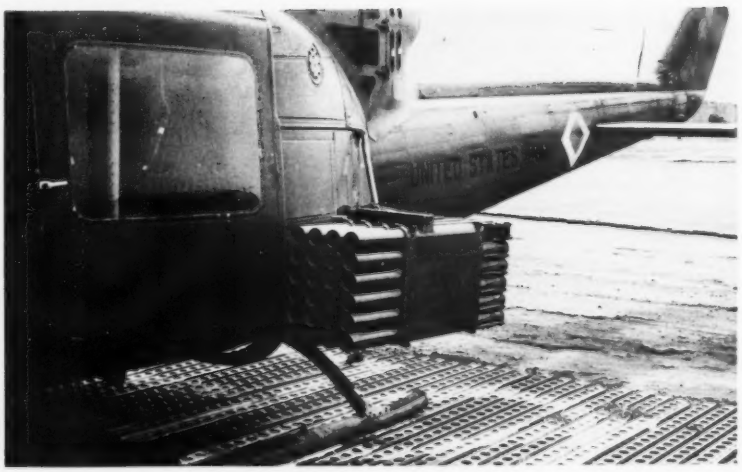


Figure 1 (above): XM-16. Figure 2 (below): XM-3/5

Figure 3 (below): XM-3



These include the M-21 which replaces the M-16 on the Huey and the XM-27-E1 mounted on the OH-6A which replaces the OH-13 and OH-23 helicopters armed with the M-2. These systems take advantage of the M-134 high rate gun (minigun) which fires at 2,000 and 4,000 shots per minute. Additionally, the HueyCobra with increased firepower is replacing the Huey B/C series.

The most important tactical consideration is the "on-station" time required for the fire team. If the mission calls for continuous overhead cover, a minimum of two fire teams must be scheduled so that one fire team will be on station while the other is refueling or rearming. If continuous cover is not required, one fire team can accomplish the mission by being aloft during critical phases of the operation and standing by at a nearby secure area ready to react if needed. When this procedure is used, it is mandatory that a reliable means of ground communications be provided. Another good procedure, when using the fire team on standby, is the use of an observation airplane to provide radio relay and to keep abreast of the situation and thus be able to brief the fire team should its use be necessary.

If a single fire team is to be used, the ground commander should try, whenever possible, to plan his movement around the fire team's on-station time. In the case of a road convoy, the fire team should be airborne while the convoy is passing the more critical areas and can return for fuel while the convoy is in relatively secure areas. If there are no secure areas along the route, continuous cover by two fire teams is usually preferred. During other ground operations, the fire team should be overhead as the ground force nears its objective or is close to suspected enemy areas.

Other services the fire team can provide while overhead include following the ground unit's movement and maintaining its exact location, which allows for immediate and accurate fire support when required; marking the ground unit's passage of phase lines and checkpoints; and, if the ground unit should become disoriented, giving them the coordinates of their location and the heading to the objective by the planned route. Also, in the frequently changing ground situation common in Vietnam, it often becomes necessary to designate different objectives. A fire team overhead can be of great assistance in choosing the most expedient route to the newly chosen objective, routing units around unfavorable terrain features.

There are many other missions in which the fire team can be of valuable assistance to the ground commander if properly used. Generally, any type of armed reconnaissance or security mission can be performed. For example, a normal sweeping operation by an armored unit could employ the fire team by taking the ground commander up for a firsthand look at the proposed route and the objectives. During this reconnaissance two objectives are accomplished: Both the fire team and the ground commander can coordinate and become thoroughly familiar with the operations plan, and the ground commander can determine likely locations of enemy strongpoints and have the fire team recon these areas by fire to get an idea of the enemy strength.

With initial reconnaissance completed, the fire team can provide overhead cover and flank security. As the operation progresses, the fire team will range ahead in an effort to detect and spring any ambushes as well as determine trafficability, bypasses, and civilian traffic that could interfere with the sweep. Even though the fire team is slightly ahead or on the flank of the ground unit, it is still in good position to provide immediate suppressive fire until the troops can deploy.

As the objective is neared, the fire team will cover possible avenues of escape and still be in position to give covering fire as the foot troops disembark from the carriers and move into their final assault positions. Here, again, by knowing the ground plan and by being overhead as the operation develops, the fire team is best suited to provide immediate fire support which, in many cases, is the difference between a success and a failure. Certainly being able to hold the enemy in position by denying him avenues of escape is one of the big tactical advantages of the helicopter.

Finally, as the friendly forces disengage the enemy, the fire team is on hand and in position to provide covering fire. Often the presence of the fire team will deter the VC from attempting a counterattack or ambush.

The fire team is capable of performing several other missions on an emergency basis if essential to completion of the mission. Probably the most important of these is tactical medical evacuation. Certainly the fire team can never perform this mission as effectively as a medevac helicopter, but in small operations serious casualties can be evacuated, saving the en route time required for a medevac helicopter, and result in lives saved.

Radio relay, airstrike, and artillery adjustment are missions which can also be performed. The normal voice radio configuration of armed helicopters includes FM for air-to-ground communications, and UHF and VHF for air-to-air communications, allowing the fire team leader to talk with the ground commander and interaircraft simultaneously. This, coupled with his ability to monitor the changing

Helicopters provide armored units with invaluable support

tactical situation enables the fire team to perform these missions with a great deal of success.

There are, however, serious limitations to the fire team of which the ground commander must be aware. Probably the most important of these limitations is the inability of the aircraft, due to its gross weight, to carry more than one observer. This means the ground commander must select the two people most capable of performing the aerial observer mission before arrival of the fire team. Normally this will be the ground commander himself and his operations officer or the advisor and his counterpart.

Another serious limitation, also due to the weight of the loaded armed helicopter, is its inability to operate out of small, confined areas. The ground commander must ensure that the area is large enough and the barriers surrounding the area are low enough to allow helicopters to get into and out of the area. Additionally, the area must be relatively secure if the fire team is to land for a briefing. The practice of not carefully selecting a landing site that is large enough, with low barriers on at least one side, and secure not only jeopardizes the fire team but also jeopardizes the entire operation.

Another important limitation that many ground commanders are unaware of is the fact that the fire team should always be employed as a team. The fire team is analogous to the infantry squad in that it is the smallest deployable unit. This is necessary for mutual protection and for the employment, by the fire team, of fire-and-maneuver tactics. This team, like the squad, is composed of two fire elements, each containing one helicopter with its organic weapons, and four crewmembers. To become an effective team, which is necessary to accomplish the mission, these eight men have trained together and rely heavily upon each other.

For the ground commander to gain the most effective use of the fire team, he must know the tactical capabilities and limitations of the fire team, and he must also be prepared to give the fire team a complete operational briefing. In most cases there is no requirement for a prescribed format for this briefing, but it is essential to the conduct of the mission that the following items be covered (notice how closely they parallel the five-paragraph operations order):

Situation

Enemy—give known or suspected location, weapons and capabilities. Also, the most likely enemy course or courses of action, free-strike zones, no-strike areas, etc.

Friendly—give type and designation of units, and previous actions affecting this mission.

Mission—the mission of the fire team for each phase of the operation.

Execution (concept of operation)

Maneuver—routes of advance, positions of each element (particularly the lead element), objectives, phase lines, checkpoints, etc.

Fire support—should include location and capability of supporting artillery, preplanned and reaction-type airstrikes, and capability of organic fire support such as mortars. This is necessary so that the fire team can remain clear of the gun target line and also be able to adjust fire support if necessary.

The briefing, in its entirety, is not necessary on specific missions, but can and should be tailored to the mission. The briefing, however short and simple, is a necessity if the fire team is to perform at maximum effectiveness.

The fire team has proved to be a very effective weapon when used by a ground commander who understands its capabilities, limitations and methods of employment. Napoleon once stated that he would rather oppose allies than a single country as the allies seldom presented a united front. If the ground commander and the fire team leader understand and appreciate each other, they will be more than allies —they will be a fighting team and a worthy adversary of the Viet Cong.

Changing Regulations—The Hard Way

Major George W. Moses

DID YOU EVER wonder how regulations came into being? Having been involved in actions which caused several regulations to be rewritten, I can shed some light on the subject. The specific incident I am about to relate took place some years ago. However, since many of the personnel involved are still active in the Army aviation program, names and date have been changed to avoid embarrassment.

On a bright Monday spring morning a number of years back members of an aviation company en route from their home base to Fort Timberline for a maneuver gathered at the Clintonberg airport prepared to embark on the last leg of their journey. Refreshed by a two day stopover and well prepared for their journey (assisted by local laws which forbid sale of alcoholic beverages on Sunday) the pilots planned their flight and contacted CAA weather for a forecast. CAA assured the leader that the weather would be VFR with 1,500-foot broken ceilings being the worst hazard on our route of flight.

The flight was planned with one fuel stop en route at Westburg. There were 13 aircraft in the flight, including one L-20 and twelve L-19s (current designations for newer aviators would be U-6A and O-1A). The L-19s were divided into four flights of three each and the L-20 was flying as cover ship for the formation. The L-20 took off a few minutes after the L-19s, arriving at the fuel stops ahead of them to coordinate the refueling.

All aircraft numbers were placed on one flight plan with a request for CAA to relay the flight plan to Military Flight Service, which at that time had flight following responsibility for military aircraft. The flight was well planned and all aircraft had maps of the intended route (although several sheets were stamped "obsolete for air navigation," they were the latest maps available at home base).

The flights of L-19s took off at about 3-minute intervals and everything went smoothly on the flight

---

MAJ Moses was first rated in November 1957, received his rotary wing rating in May 1959, and has logged well over 2,000 hours of total flight time. Currently he is serving in Vietnam following an assignment at the Aviation School.

to Westburg. After refueling, the aircraft departed in flights as they finished refueling and the crews finished eating lunch.

I was in the second flight of L-19s as we departed for Eastburg, which was our destination. About an hour out of Westburg, we began to encounter a scattered layer at about 1,000 feet above the ground. Contact with the lead flight revealed that they had climbed up on top of this layer and that it had become a solid overcast with a higher overcast at about 8,000 feet. Our flight leader decided we would remain underneath the cloud layer until the lead flight determined whether there were any breaks in the overcast. About 30 minutes later, we were still in the clear underneath the clouds when the lead flight radioed that the layers were merging on them from the south and they were detouring to the north to remain VFR.

By this time we had entered a range of low hills, and although we still had good visibility the clouds were within about 500 feet of some of the hilltops. The flight leader decided our best plan of action was to reverse course and return to Westburg. Starting a turn to the right, we discovered our decision had been a little late as a band of showers had moved in to our rear and the hills behind us were now in the soup. Since the terrain to the north was higher, we could not turn that way so the only avenue open was to our front.

A rapidly moving squall line from the south soon obscured the hilltops and limited us to several hundred feet in the valleys. The flight leader attempted to contact Smallview tower, which was the next major town on our route, but due to our low altitude and terrain problems we were unable to contact anyone, including the other flights. Due to the nature of the terrain and the deteriorating weather conditions, the flight leader decided we should land at the nearest available airfield and wait for the weather to improve before proceeding.

Checking our maps, we discovered that we were only a mile or so from the Harrisville airport, which was shown as a 2,000-foot dirt runway and was located right beside a river which would aid in locating it. Within about five minutes we had located the strip. Since it was on my side of the formation, the leader told me to break off and be the lead aircraft for landing. Because of the wind, we had to land to the west. The strip ran generally east and west along the edge of a river. At the east end of the strip, the river curved to the north and had a bluff about 150 feet high on its east bank.

The wind was rather gusty on my approach and rain was limiting visibility, so I kept a fairly high airspeed with approximately 30° flaps and found myself high on short final. I executed a go-around and advised the other two ships they would have to have a steep approach to clear the bluff and make the runway. The other two ships landed and advised me the runway was muddy and slick, but had presented no particular problems.

This time I set up a full-flap approach and executed a good three-point touchdown on the first 10 feet of runway. I touched down slightly left of center and immediately began to angle towards the left side of the runway, despite right brake and rudder. However, I was not too worried as my groundroll had almost stopped, and I did not feel I would run off the runway. The termination of my landing was like a slow-motion film. Along the edge of the runway was a low bank about a foot high. Just as my forward motion was stopping, my left wheel struck the bank, causing the aircraft to pivot. I instinctively stood on my right brake, which for the first time found a patch of solid ground and stopped. Very slowly and gently, the tail came off the ground and we came to rest with the propeller, which had stopped crosswise, balanced on the bank and supporting the aircraft.

A quick check revealed no apparent damage. While our flight leader hitched a ride to town to phone back to home base, we enlisted the aid of a few civilians who had arrived on the scene and lowered the tail to the ground. There were no nicks or damage to the propeller; however, a track check showed one blade was out of line approximately ¼ inch.

The crewchief on my aircraft was a tech inspector, so after a 30-minute runup showed no metal particles on the oil screen, and the only problem to be a slight vibration at low rpm, a decision was made that we would fly to Smallview if we could get a new prop. The prop was removed and placed in one of the other two aircraft which departed for Smallview.

While waiting for their return, we discovered several interesting facts about the airfield, which was in fact no longer an airstrip. It had been closed and converted to a dragstrip some two years ago. Also the reason I had been unable to stop my left drift was the fact the first 100 yards of strip sloped about 20° to the left.

For those who are wondering, we had taken pictures of the aircraft and recorded all the necessary measurements before moving it in case an accident investigation was required. AR 95-5 at that time merely said that the aircraft should not be moved from the scene of an accident without permission of the president of the accident board if the location of the wreckage or debris would aid in the accident investigation. I am familiar with this regulation, as two years later

I was involved in an accident which resulted in changing it. However, that is another story.

After about two hours, the other two aircraft returned from Smallview and landed without incident. They still had the same propeller as there had been no National Guard aircraft at Smallview, and the nearest Army airfield was several hours flying time away. They had taken the prop to a civilian repair shop and after a careful inspection the man in charge had said there was nothing wrong with the prop—in fact it was probably in better shape than most of the civilian aircraft he worked on.

So, after reinstalling the prop and going through another series of power checks and rechecking the oil screen, we decided I would fly it to Smallview. The flight was without incident and this time we went to the Air Force portion of the base to obtain a BOQ and contact our leader.

When we walked into operations and explained who we were, the operations Sergeant got sort of a glazed look in his eyes and asked us if we were serious. Not quite understanding his attitude, we questioned him to determine if he had any information concerning the remainder of the aircraft. As he explained, we began to understand his attitude. It seems flight one had become trapped between layers and finding a hole had executed a rapid descent to get underneath. Plane number 3 containing the only noninstrument rated pilot became separated. The lead two aircraft had contact with him and when they broke out over an airfield they landed to wait for number 3, who had found a water tower and having been given directions to Island View airport was en route.

It was still raining when he arrived and after passing over the field he entered an abbreviated downwind for landing. Island View was a sod runway with one wide runway running the full length of a cleared area. At the right side of the runway a farmer had plowed a strip the full length of the runway immediately adjacent to the markers and about 75 feet wide. To number 3 that paved strip sure looked good, and it wasn't until he stepped from his inverted aircraft and sank to his knees in mud that he fully understood why a beautiful landing had suddenly turned into an inverted slide.

The leader of flight one, having been impressed with getting the pilot to a flight surgeon ASAP took off with the remaining two flyable aircraft for Eastburg, leaving two people at Island View with the overturned aircraft. Flight number three had heard flight one and two get into trouble trying to go over and under the cloud layer so they had diverted to Atlantus. The flight leader of flight four had had a partial engine failure on takeoff from Westburg and his flight was at Westburg.

No one could contact or locate the L-20, and now our flight which had been reported down at Harrisville with one aircraft wrecked had shown up at Smallview! At about that time the operations sergeant completely lost his composure when informed that an Army L-20 bearing the number of the missing lead ship had just taxied up to the ramp. A quick check with the group leader revealed that he had been unable to contact Smallview to obtain IFR clearance (Army aircraft radios in those day were not the world's best) so he had detoured to the north and landed at Lewisville.

Upon calling home base he had found out about the aircraft down at Island View and had come to Smallview after refueling. Grand score for 13 aircraft: two aircraft at final destination with one of them having a revised crew. The remaining aircraft were scattered over three states.

After a long talk with Flight Service, it was determined that although there was a possibility we might have violated a few Army regulations all flight leaders had informed Flight Service of their status and other than providing them a very interesting day no further action was planned. However, the next day by TWX, Flight Service Regulations were changed to include a requirement that "No more than one flight of aircraft under the direct control of a leader will be listed on one flight plan."

Lessons learned or moral of the story? When making an extended cross-country flight as a unit, plans should include en route accident plans including previous coordination as to who will be responsible for investigating the accident and furnishing board members. All crew members involved in the operation should be briefed on accident and incident reporting and current regulations regarding release of information and safeguarding of an accident scene. When planning a flight based on sequence reports, information should also be obtained on any possible weather areas that could move across the flight path, even though destination and en route stops are forecast to remain VFR (which they did throughout the day in question). Last but not least, if any doubt exists as to whether a flight can be completed VFR, do a 180° or find a place to land before it is too late.

As for the Harrisville airport being closed, the charts we were using were the latest available, and attempting to verify the status of each airfield on to route would be an impossible task. The fault here was with the CAA for not checking to ensure the airfield was properly marked when it was closed.

That in a nutshell is how you can change a regulation the hard way if you interested in trying.

How Fast Is Your Crosscheck?

. . . too damn slow?

Major Willis L. Manley

HAVE YOU EVER tried to describe the color "red"? It is not easy. In fact it is much easier to point to examples of it. Many words are of this type in that it is difficult to find a concise, accurate definition. "Crosscheck" belongs to this class of words. Although the term can be defined to serve the general meaning, individual interpretation and use of the word often assume widely varied proportions.

The aviation related term "crosscheck" had its origin some 40 years ago, before the development of attitude instrument (blind) flying. As aircraft instrumentation improved and instrument flight training programs were conceived, the term gained significance and has finally entrenched itself into aviation training as a commonplace teaching vehicle.

"Crosscheck" is a reasonable sounding term, and it is reasonably safe to say that at one time or another our aviators have heard the expression, "Your crosscheck is too slow." To the student aviator performing any given maneuver unsatisfactorily it seems to be one of the favorite criticisms for an instructor to make. It is also an ever-ready, custom-made comment to jot down on a grade slip. To the rated aviator undergoing an annual instrument renewal ride, it may be a blow to the old pride but to the student aviator it is a problem.

In defining the term one current reference states, "Crosschecking is observing and interpreting two or more instruments to determine the attitude and performance of an aircraft." Another reference simply states that "Instrument coverage is

---

Since having written his article "How Fast Is Your Crosscheck?" MAJ Manley has separated from the Army and is operating a cattle ranch in Hall, Mont. The "instrument low approach system (ILAS)" he refers to should not be confused with ILS.

called crosschecking." The popular spur-of-the-moment definition by a rated aviator is something like this: "Crosschecking is looking at the instruments necessary to perform a given maneuver."

None of these definitions is wrong, but as was stated at the beginning a concise accurate definition is difficult to find. To attempt to adequately define or discuss a crosscheck without discussing movements of the aircraft controls is to do only half a job. Somewhere between the knowledge a pilot receives from observing instruments and the knowledge of what movements to make with the aircraft controls lies the meaning of a crosscheck. Since the only course of action open to the pilot is through the manipulation of controls, it appears that everything he learns from observing instruments must be filtered down to this level for him to participate in the flight at all. This would suggest that part of a crosscheck is determining what to do with the controls and actually doing it.

In an actual training situation I encountered a student who was having more than his share of problems while flying under the hood. On our first flight I gave him an opportunity to "warm up" on a few basic maneuvers before demonstrating an ILS approach. It soon became apparent that this student wasn't ready to tackle anything new. After a few moments of trying to isolate a possible problem area, I assigned him a heading and altitude and started a running conversation on his instrument crosscheck. He stated that he had been graded down by his instructor because his crosscheck was too slow and that he was concentrating on speeding it up.

At this point I asked him "How long does it take you to crosscheck your instruments?" He quickly and quite proudly stated "about 4 seconds." After throwing him several lauditory comments I reassigned the altitude and heading and emphasized that he be especially accurate. I then asked him to go through a crosscheck and tell me when he started and when he stopped so I could time him. He readily agreed and said "GO . . . STOP." To my surprise the elapsed time was 4 seconds. After a few more verbal pats on the back I suggested we try it again. A repeat of the procedure produced exactly the same results.

I was never sure what instruments the student fixated (other than the clock) but this exercise lasted approximately 25 seconds, and at the conclusion my only question was, "Why are you off your assigned altitude 140 feet?" After a moment of groping for an answer the student stated it perfectly, "I don't know." Later in the flight debriefing the student stated he had noticed the altitude was off but he did not know why he had failed to attempt a correction.

By book definition he had observed and interpreted the aircraft instrument. In so doing he had detected an error but failed to correct it. How valid was his rapid crosscheck? There is no positive way to determine if each eye fixation results in the gain of useful information but in this case it was obvious. For some reason there was a complete breakdown in the filtering down of altitude information from the instrument observations to the movement of aircraft controls.

It is conceivable that many eye fixations actually do not result in the assimilation of information displayed on the instruments but rather are made simply because the instruments are within the visual field. Our flight school students are the most energetic group of young people assembled anywhere and their desire to learn and improve is incomparable. When one is told that his crosscheck is too slow he wants to do something about it. He attaches to the comment the most liberal of interpretations and attacks the problem the best way he knows how. His eye fixations per unit of time increase, valid information received from his instruments decreases, and the filtering down of information to the aircraft controls is quite adversely affected.

Theoretically, under ideal conditions, once an aircraft is established "at altitude" we could fly any given altitude and straight line with reference to only the attitude indicator. This would mean of course no wind, no turbulence or instrument error, and that we maintain a perfect sight picture on the attitude indicator through the manipulation of aircraft controls. If we desire to turn to a given heading we must have a heading indicator. Then, if we wish to climb or descend to a different altitude we must have an altimeter. With reference to only these three instruments we can practice basic attitude instrument flying and eventually gain some measure of confidence in the instruments and in our ability to fly the aircraft using this method of blind flying.

Confidence will improve performance and improvement in performance will breed confidence, so we set up a kind of chain reaction. With an increase in confidence and familiarity we will find that our instrument interpretation time decreases, allowing us more time to fixate other attitude instruments. Eventually our scan will include the airspeed and vertical velocity indicators during climbs and descents; we will use the turn needle to verify a standard rate turn; we will check the magnetic compass to verify the indication on the heading instrument—etc.

Now that we understand and have practiced basic attitude instrument flying we wish to give the aircraft geographical orientation.

How Fast Is Your Crosscheck?

This involves the addition of a radio navigation instrument and means only one more instrument to take into our crosscheck. (Assume it is the VOR course indicator.) It sounds simple enough but this seems to be a culprit, for it is at this point that we notice a deterioration in operator performance. Normally, this deterioration is caused by our confrontation with a new problem and is only temporary. Each time we fixate this new instrument we have a tendency to stop our crosscheck and do the mental gymnastics necessary to determine courses, radials, headings, etc. However, after a few hours practice flying the VOR system we smooth out, and operator performance improves.

Suppose operator performance does not improve. There has to be a reason. We have had the required practice and have previously demonstrated an adequate crosscheck, so obviously something else is involved. Let us examine the case of the student whose overall performance on basic instruments and the VOR system was consistently above average. However, each time he was given a basic track interception problem, his control touch deteriorated and heading and altitude control became a major problem. He could complete an otherwise successful track interception and upon completion would return to his normal above average performance.

Knowing this much, how would you evaluate his performance? Would you downgrade him on VOR track interceptions or would you downgrade him on control touch and altitude control because of a slow crosscheck? In the final analysis it was determined that this student did not thoroughly understand how to make a track interception. Although he paralleled the desired course and centered the course deviation needle, he did not know why he centered the needle. He arbitrarily selected an intercept angle of 45° in all cases and hoped for the best. It seems that lack of understanding of procedure is the area to be isolated in this case. Yet the old cliche "Your crosscheck is too slow" works very well to handle situations such as this one.

During instrument flight evaluations of both student and rated aviators, it is quite common to see excellent operator performances during instrument flight. Occasionally, however, when an examinee is confronted with loss of two-way radio communications there is a definite deterioration of heading and altitude control. I don't believe it is due to a slow crosscheck; rather I believe that confidence is affecting performance, for invariably this examinee will not thoroughly understand lost communications procedure.

Many studies have been conducted by various agencies to determine just how pilots use their eyes during instrument flight. What percentage of the total time available is spent in seeking information from each of the different instruments? How are the frequency and duration of eye fixations influenced by factors such as pilot experience, instrument lighting, and the particular maneuver being flown at the time?

Data on the answers to these and other questions have been compiled and reveal a host of interesting results. One such study was conducted at Wright-Patterson Air Force Base by the USAF. A group of instrument rated pilots were studied during routine maneuvers under actual instrument conditions. Their average total flying experience was 2,093 hours. Through the use of special photographic equipment it was determined that the average number of eye fixations per minute was between 105 and 109, depending on the maneuver being flown. (Only straight climbs and descents and level turns were evaluated.)

Two-thirds of all available time and two-thirds of all eye fixations were devoted to the attitude indicator, the heading indicator, and the airspeed indicator. Eye fixations on flight instruments varied from 0.70 seconds on the attitude indicator to 0.34 seconds on the turn needle. Fixations on engine instruments usually exceeded one second.

A similar and more interesting study was conducted under simulated instrument conditions while flying the instrument low approach system (ILAS). A group of instrument rated pilots were used whose total flying experience varied from 700 to 5,000 hours and averaged

slightly over 2,000. Their hood and weather time varied from 65 to 500 hours and averaged approximately 200. Each of the pilots made two approaches using a C-45.

The camera was started as the aircraft passed over the outer marker and a 30-second sample of eye fixations was obtained. The camera was started again as the aircraft passed over the middle marker and another 30-second sample of eye fixations was obtained. The average number of eye fixations for this group was 106 per minute during day flight and 87 during night flight. Of the 106 during day flight, over half were made on just two instruments, the deviation needle and heading indicator. Two-thirds of all the time available was spent on these two instruments. Of the 106 fixations, 91 were made on only four instruments for 87 percent of the time available. These four instruments were the deviation needle, heading, attitude, and airspeed indicators.

It is interesting to note that the airspeed indicator and altimeter were fixated almost an equal number of times, and that the turn needle was not used at all in many cases. Inference can be drawn from studies such as these that there is a definite correlation between total flying experience and number of fixations per minute. Pilots with more experience tend to make more, shorter fixations per minute. When this group was divided according to total experience, the group with the least experience averaged 100 fixations per minute while the more experienced group averaged 112. Similarly the pilots with the most ILAS experience averaged 120 total fixations per minute while the least experienced averaged only 96. If we were to reduce the experience factor used for this study to that of a group of initial entry students, we would have a much greater appreciation of their capability to "speed up" their crosscheck.

Although more experienced pilots fly better than less experienced pilots, it cannot be concluded that rapid eye fixations are the cause of better instrument flying. Nor does it necessarily follow that by forcing himself to move his eyes more rapidly over the instruments, a pilot will increase his flying skill. It is quite possible that eye movements simply reflect the speed with which a pilot interprets instrument indications. It is quite possible also that eye movements are a direct indication of how well a pilot knows procedure. Conversely, if instrument interpretations and corrective aircraft control movements are coming slower than normal, all that can be gained by a faster crosscheck are more useless eye fixations.

How about it? How fast is your crosscheck? Each time I fly instruments, mine seems to take all day.

Share It

a fireball disappeared around the left side of the aircraft

I WAS AT ASSIGNED flight level (80) in the clouds with moderate snow when an explosion occurred in the nose section of the aircraft. My copilot and myself observed a fireball at the instant of the explosion and it disappeared around the left side of the aircraft. An immediate check of all instruments revealed all to be normal. The VHF radio continued to function properly as did the five-channel emergency transmitter. Navigation radios remained normal.

Upon landing an investigation of the aircraft revealed a three inch, perfectly round hole in the Radom and when the Radom was removed two holes were found on the lip of the radar antennae approximately $\frac{3}{32}$ and $\frac{1}{16}$ inch respectively. The two screws holding the vertical travel indicator were burned away. Two holes, $\frac{1}{4}$ inch in diameter, were burned in the antennae vertical travel index card. Two holes, $\frac{3}{8}$ inch in diameter, were burned in the rudder approximately $\frac{1}{2}$ inch above the rudder trim tab.

Immediately after the explosion, similar to 20 mm high explosive, the weather rader (Collins WP103) went blank and the set was turned off at that time.

It is theorized that the aircraft had been struck by lightning. None aboard the aircraft had observed lightning in the vicinity of the airport of departure or during the climbout to our assigned flight level. Upon reaching our assigned flight level the tops of the clouds appeared once or twice at an estimated 10,000 feet. When the incident occurred we were experiencing light turbulence.

Local Forum Discusses Aviation for the Provinces

Lieutenant Colonel Roger W. Kvernes

Scene—

Studios of a TV station somewhere in the U. S. A public affairs program is about to begin. Three panel members are at desks. The moderator is slightly forward and to the right. The telecast begins with the camera on the full panel and then zooms to the moderator.

Mr. Thorpe—

Good afternoon. I'm Bob Thorpe and this is the Local Forum coming to you from the studios of BIL TV. Our discussion today concerns the helicopter's role in a peacetime environment. Most of us are aware that this unique machine is being used extensively in our military operations in Vietnam, and that our government has bought several thousand of these aircraft. The advantages they have given our fighting men over the Viet Cong are unquestioned. But now many of our soldiers and civilians are asking whether the helicopter will be of value after hostilities cease.

To discuss this question we are fortunate to have on our panel two Army aviators who have been flying combat missions in Vietnam and a gentleman from the State Department who has also spent some time there.

Major Stephens, I understand you just returned from Vietnam.

MAJ Stephens—

That's right. Just last week as a matter of fact.

Mr. Thorpe—

And CPT Byrd, how long have you been back?

CPT Byrd—

About two months.

Mr. Thorpe—

Mr. Cobb, what were you doing in Vietnam?

Mr. Cobb—

I was with the State Department's United States Operations Mission. We called it USOM for short. It is now the U. S. Agency for International Development (USAID).

Mr. Thorpe—

For the past few years concerned Americans have watched with great interest the increased use of helicopters by our Armed Forces in Southeast Asia. Now looking forward to an end to this conflict, many people wonder whether these aircraft will be of any use in building the peace.

Major Stephens, I've heard the term "nation building" used in relation to our efforts to develop or reconstitute a country's social, political and economic fabric. Would you like to begin our discussion of what's likely to happen when hostilities cease?

MAJ Stephens—

To get things off on the right foot, I think it should be clearly understood that the fighting just won't suddenly stop like it did in World War I and II. Instead, there will be a gradual diminishing

of hostilities, with the Viet Cong disappearing into the holes they came from. For a long time the diehards will cause occasional flareups.

Mr. Thorpe—

Then you think that even after we have started our reconstruction of the country we will have to conduct counterinsurgency warfare as we are doing now.

MAJ Stephens—

That's right, only the term counterinsurgency warfare is now out of date, so to speak. Internal Defense/Development is what our current effort in Vietnam is called.

Mr. Thorpe—

I see.

MAJ Stephens—

But regardless of what our effort is called, some time in the future this effort will be directed away from guerrilla operations and move toward development of the country, or nation building.

Mr. Thorpe—

How will this change aviation operations?

MAJ Stephens—

Well, there will be fewer air assaults and more command and liaison [C&L] missions. Airmobile forces will probably be much smaller, rarely bigger than company size.

Mr. Thorpe—

Then it would seem that if the size of the airmobile assault forces decreased and fewer assaults were conducted, much fewer aircraft would be required.

Mr. Cobb—

May I answer this one? As military operations diminish in scope, internal development of the country will be expanding. In their work the USAID people will have to move about, and the Army has shown us that the best and most economical way of doing this in Vietnam is by air.

Of course, roads and canals could be used, but there will be two good reasons for going by air. First of all, any remaining guerrillas will probably direct their efforts against any actions to influence the people. They will continue to attempt to keep the populace isolated from the established government, so we can expect many small scattered communities which are relatively inaccessible to surface transportation.

LTC Kvernes selected aviation's role in Vietnam following hostilities as we know them today because of the popular concern over what is to happen. His television forum is fictitious and has not taken place. LTC Kvernes currently is assigned to the Aviation School at Fort Rucker.

Mr. Thorpe—

Well, if all that will be needed is transporting people from one point to another, why not let a civilian contractor do it?

CPT Byrd—

If we could get the civilian contractor to conduct combat assaults we could. Unfortunately, this is not practical, or possible.

Mr. Thorpe—

Why not let the civilian contractor handle the C&L and have Army aviation take care of the combat assaults?

CPT Byrd—

I don't think we can afford the luxury of two separate fleets of aircraft. We will have to do just like we did in the period 1961 through 1965—use our helicopters for C&L when a combat mission was not required but when something broke, pull them off C&L.

Mr. Thorpe—

Mr. Cobb, you said there were two reasons for using aircraft to transport the USAID people. What is the other one?

Mr. Cobb—

Economy. Experts of the type needed to rebuild a country are in short supply. With road conditions being what they are in Vietnam, it would take a long time to go from one place to another. A trip that would take hours or even days by ground vehicles would only take minutes by helicopter.

Mr. Thorpe—

Mr. Cobb, some of our listeners may not be familiar with United States Agency for International Development. Will you tell us something about it?

Mr. Cobb—

The duties of the field representatives of USAID are similar to those of the military advisor. As you know, military advisors are furnished the province chief sector commanders. The USAID furnishes civilian advisors to the province chief to counsel him on administration of the civil affairs in the province. Each province has a principal advisor and assistants.

Incidentally, these advisors provide the foundation at province level on which to build a government capable of conducting integrated, decentralized control of the development and defense of the country with guidance from the national government. Under these conditions the Vietnamese Army's corps and division headquarters should play a smaller role, thus freeing experienced, educated, and capable people for other tasks.

Mr. Thorpe—

Will this eliminate the need for aviation battalion, group, and brigade headquarters or reduce the role played by these headquarters?

MAJ Stephens—

I'm afraid not, but their roles will change. Airmobile companies located in the province may be under operational control of the Army sector advisor.

Mr. Thorpe—

United States or Vietnamese Army?

MAJ Stephens—

U. S. Army.

CPT Byrd—

When hostilities slacken, there will be few operations of the "big lift" type that we now have. Operations will be more like the eagle flights of a few years ago. When intelligence reports that a situation has developed or is developing, there will be an immediate reaction.

Since we must react fast, we can no longer base an entire airmobile battalion at one place. In each average size province in Vietnam, we will probably have an airmobile company reinforced with fixed and rotary wing observation aircraft.

Mr. Cobb—

This would then place an airmobile company at the first level at which military actions and civil affairs are integrated. At the level the aircraft will be operating, every military action will require a specific civic action and vice versa.

MAJ Stephens—

It may appear unreasonable to have a fixed base at every province rather than have our aviation units at a central point within a corps or at two or three points. Right now it's to our advantage to have them at central points, but when military activity decreases there will be less centralized control and military operations will be decentralized.

Mr. Thorpe—

Well then, Major Stephens, when do you think we will be able to pull Army aviation out of Vietnam in any significant numbers?

MAJ Stephens—

When three conditions are met. the road, inland waterway, and railroad systems must be restored to the 1954 level and expanded by about 50 percent, transportation facilities must be free of guerrilla interference, and the established government in Vietnam must have the support of the civil populace.

Now I'm not saying that Army aviation will, in the meantime, assume the transport burden normally provided by roads, canals and railroads. All we can do is provide the high-speed, immediately available transport that will be needed to restore and expand these facilities.

Mr. Thorpe—

I see our time is up. From the points brought out today, it seems that the helicopters used so dynamically today in combat will continue to serve as effectively in more peaceful times.

This has been an interesting discussion, and we appreciate our panelists meeting with us on Local Forum. On behalf of Major Stephens, Captain Byrd, and Mr. Cobb, this is Bob Thorpe thanking you for viewing us today and inviting you to join us next week on Local Forum when we'll meet another distinguished panel of experts.

Airmobility In Europe

PILOTS OF THE 18th Aviation Battalion in Germany have been training toward an Army first. In the airmobile training program the unit has been conducting, one of the primary objectives is "the first fully airmobile trained corps in the U. S. Army."

The unit's aviators, most of whom in the program are from the 350th Aviation Company, are training two companies a week in the techniques of airmobile assault and evacuation.

Having started last fall with Company D, 17th Infantry, all maneuver battalions in V Corps, including those in both corps divisions, will have at least one company trained in the techniques so useful in Vietnam today.

By the time the program is completed this spring, every company will have taken the training. If the program is completed on schedule, V Corps will be the first fully airmobile trained corps in the Army.

Following extensive classroom work and ground practice with static equipment, each of the companies is lifted via CH-34 helicopter into a simulated air assault situation, usually three times during the day of training.

After taking control of their first assault area, the men make contact with the flotilla of helicopters and are carried to the next landing zone, all under simulated combat conditions.

Troops of the 3rd Armored Division in Europe train with CH-34s of the 350th Aviation Company

CRASH SENSE

the following 28 pages prepared by
the U. S. Army Board for
Aviation Accident Research

WATCH A PRO, WETUMSKI!!

Pierce Wiggin

OVERGROSS? Wetumski, you're getting to be an old maid!" shouted the self-acknowledged world's greatest aviator and CO of an armed helicopter company. "Put away those charts and pay attention while I show you how it's done!"

"Sir, the pressure altitude is 4,000 feet."

"Would you like me to send for some oxygen, Wetumski? Are you feeling weak?"

The young warrant officer's face reddened behind his visor. His gloved hands clinched as he stared at his aircraft commander. "Major Frozzleforth, the outside air temperature is 42° centigrade. According to the performance charts, we're too heavy for any kind of safe takeoff!"

"Enough, Wetumski! Haven't you learned anything flying with me? You know what I think of those charts! If I had my way, they'd teach you youngsters to fly without ruining your eyes on small print, graphs and charts!" Frozzleforth's eyes scanned the panel and settled on the fuel quantity indicator. He jerked his head around and shouted to his crewchief, "Jackson, why didn't you refuel?"

"Mr. Wetumski said we had too much already, sir."

Frozzleforth pounded his fist on his knee and

glared at his pilot. His voice exploded, "Wetumski, by thunder, I've had enough!" He snapped his safety belt open and threw his shoulder harness off. "I'm going in for a cup of coffee! When I get back, this aircraft had better be refueled and ready to go! Do you read me, Wetumski?"

"Yes sir!"

Frozzleforth stepped out and tramped across the grass toward operations, slapping his yellow gloves against his thigh and trailing muttered words best learned from latrine walls.

The startled eyes of his crew followed him until he stepped through the door and disappeared. Wetumski slammed his clipboard to the cockpit floor. "Better do as he says, Jackson. He won't listen to me!"

"Sir, couldn't we offload some of this extra ammunition and the major's ice chest? The barrels will melt before we can shoot this much and that chest must weigh 50 pounds."

"You heard him chew me out. Better leave it on." He reached for the clipboard. "You and Hank be on your toes when we start to take off. We'll be at least 1,200 pounds overgross. If he gets it off, we're bound to lose rpm. Strap yourselves in tight and be ready for anything."

"Yes sir." Jackson released his safety belt. "I'd better get that fuel aboard. Come on, Hank, give me a hand."

The door gunner, whose inexperience with a razor was apparent from two fresh nicks on his chin, followed the crewchief outside, stumbling under the bulk and weight of his body armor and flak vest. "Jackson, I don't like this. I don't like it at all! Mr. Wetumski thinks we're gonna crash, don't he?"

"Yeah, I guess he does. Get me that hose."

"Can't we unload some of this stuff and hide it?"

"We can if you want to find yourself in front of a court martial for disobeying orders."

"How about you making the fuel gauge read full and don't put any more in?"

"Can't be done. The major'll be back any minute and I'd have to pull the gauge."

"Why won't the major listen to Mr. Wetumski?"

"Major Frozzleforth's not famous for listening to anybody, especially anybody under his rank!" Jackson withdrew the fuel hose nozzle. "There, d..... him! If he gets this load off, he'll be as good as he thinks he is!"

Frozzleforth arrived at the helicopter and found his crew aboard. He climbed into his seat and strapped himself in, then stared at his pilot with a wide grin under his handlebar mustache. "Well, Wetumski, are we ready to go this time?"

"We have a full fuel load, sir. Our gross weight is now 8,800 pounds. Shall I read the prestarting list for you?"

"No thank you, Wetumski. We don't have time for reading. Because of your nonsense, we're 10 minutes late as it is!" Frozzleforth's grin snapped off. "When will you youngsters ever learn to fly without that infernal checklist? This isn't Alabama, Wetumski! This is for real! It's high time for you to show your mettle! Pay attention and watch a pro operate!"

As though conducting a polka, Frozzleforth's hands dashed around the cockpit, slapping switches and twisting knobs. He gripped the collective and squeezed the starter as his gloved thumb punched the clock.

Wetumski cinched his safety belt tighter. He watched with horror-filled eyes as his commander ignored the prestart procedure and violated the starting sequence. Though not yet of voting age, his vocabulary included many short and highly descriptive words learned on the docks of his home city. He silently used them all against the fate and system that had deposited him in the same cockpit with Major Horatio Frozzleforth.

The world's greatest watched the N_1 speed reach 40%. He released the starter and whipped the throttle over the flight idle stop. "Make yourself useful, Wetumski. Turn on the radio. I'll soon be ready to leap off!"

"No runup, sir?"

"Yes, Wetumski!" Frozzleforth rolled his eyes heavenward, then glared at the young warrant officer. "Any more static from you and I'll run you up the flagpole! That'll be your runup! Tell control I'm ready to go!"

"Yes sir! Nest, this is Rooster One. Ready for takeoff. Over."

"Rooster One, you're cleared to the runway. Wind calm, altimeter two-nine-eight-nine. Be advised there are construction crews working at the east end of the field."

"Negative on the runway, Nest!" Frozzleforth shouted into his boom mike. "I'm running late. We'll leap off from here!"

"Rooster One, it's SOP for gunships to use the runway. Over."

"Isn't it enough that I have a bookworm for a pilot? Must I also be cursed with a rulesquoter in control?" Frozzleforth clamped his cyclic and squeezed the transmitter trigger. 'Nest, this is Major Horatio Frozzleforth, aircraft commander of Rooster One! For your information, I am also a

company commander. I intend to exercise my prerogative and take off from here! Is that clear?"

"Rooster One, it's clear, sir. We have approaching traffic 5 miles west. Please remain clear of their approach path."

Frozzleforth began pulling pitch. "Here we go, lads!" Rocking on its skids, the Huey lumbered forward, jouncing its occupants, and raising a cloud of dust.

A series of loud pops penetrated their helmets and earphones. Frozzleforth shouted over his shoulder, "Can't you chaps wait until we're airborne to test those guns?"

"We haven't touched the guns, sir! That's coming from the engine!"

Wetumski glanced up at the overhead console. "Would you like me to turn the bleed air heater off, sir?"

"Turn it off! Turn it off! What in blue blazes is it doing on?"

"Without the prestart check, I have no idea, sir." Wetumski reached up and turned the bleed air knob to the off position.

The popping noises stopped as they slid forward, gaining speed. Frozzleforth pulled more pitch and the skids left the ground.

"RPM 6400 and falling, sir!"

Frozzleforth shoved forward on the cyclic and the nose dropped until they were looking out through the top of the windshield. The helicopter dropped, hit with a sharp jolt, and bounced back into the air.

"Fence ahead, sir!"

Frozzleforth yanked upward and the skids grazed the top strand of barbed wire.

"RPM 6100, sir! There's a clear area ahead if you'd like to put it down!"

"Put it down, indeed! Wetumski, where is your warrior blood? The word is charge!"

"Do you have the bulldozer in sight, sir?"

"Relax, Wetumski, relax!" Frozzleforth pulled more collective and chuckled as the bulldozer driver dived for the ground and rolled through the dust. "Good training! Keep him alert!"

Their skids cleared the stalled bulldozer by 2 feet as the heavily loaded rotor strained to get them into translational.

"RPM 5900, major! Better put it down while you can!"

WATCH A PRO, WETUMSKI!!

Frozzleforth pushed forward against his straps, his smile gone, attempting to gain more speed with body english. He lowered the collective slightly and his smile returned as the rpm held and slowly increased to 6000. The helicopter dropped until the skids were brushing through the tall grass off the end of the field.

"Trees ahead!"

Frozzleforth jerked his eyes from the tachometer and stared at the line of trees directly in their path. He selected what appeared to be the low point and aimed for it, hauling up on the collective at the last possible second. The Huey responded with a valiant upward swerve and the skids brushed through the treetops. One branch, bent forward, sprang free, and slapped into the tail rotor. The whirling blades sawed through it, one blade breaking off at the hub. The remaining blade shook the tail rotor apart and the helicopter spun wildly, slamming into the ground and rolling on its side.

Wetumski heard the pinging of cooling metal in the sudden quiet. Then his ears detected a gurgling sound. Fuel! He slapped his safety belt open and pulled himself up, standing on the pedestal. "Hey, you guys all right back there?"

"I think so, sir!"

"Give me a hand with the major! He's knocked out and this thing's liable to blow up any second!" He stooped to free his commander and pulled him erect, shifting around to give the crewchief room. "Easy now, Hank, you get up top and pull him through!"

Struggling under the limp and heavy weight, the three crewmen got Frozzleforth out and pulled him to the trees, just as the spilling fuel reached an ignition source and the wrecked helicopter was engulfed in flames. As the heat reached its ammo supplies, the burning craft emitted explosive sounds with a rapidity and volume that would have brought pride to Chinese new year celebrants. They hugged the trees, crouching to make the smallest possible targets.

Sporting a jaunty head bandage, his arm in a sling, Frozzleforth marched into the flight surgeon's office. "Morning, doc! I hear you're letting me out of this pill palace today."

"Yes, major. Sit down, please. I'm just finishing my portion of the accident report and I have a few questions. After that, the battalion commander wants to see you."

"Ah, yes! I imagine he wants to present my Purple Heart and thank me for the superlative flying job I did in getting us down with no injuries to my crew. Splendid chap, our CO!"

"I hardly think so, major. As a matter of fact, he said something about a collateral investigation and flight evaluation board. I'm told you always fly with your helmet chin strap loose. Is that correct?"

"Yes, doctor, I do that to inspire confidence in my crew. I'm sure you can appreciate the psychological implications. It lets them know I have absolutely no fear of crashing."

"I see. That explains why you lost your helmet and almost lost your head. It also explains why you were knocked out and your crew had to risk their lives getting you away from the wreckage before it burned."

"Valiant lads, my crew! I'm thinking of recommending them for the Soldier's Medal!"

"I also heard you were in the club until 0300 on the morning of the crash. The attendant said you wouldn't let them close."

"Doctor, you're a flight surgeon, but it's easy to see you're not a true member of the flying fraternity. If you were, you'd realize we fliers don't keep track of time when we're discussing our profession! I was relating a few of my World War II and Korean exploits to some of the younger pilots. I'm a firm believer in sharing my vast experience and knowledge!"

"So I was told. It must have been a very thirsty discussion, from the amount of your tab. Do you recall how many you had?"

"Only enough to refresh my memory and sustain my sparkling dialogue. As you know, some of us are blessed with a greater capacity than others. Surely you're not insinuating my expert judgment and superb physical abilities were in any way impaired!"

"Of course not, major. I assume you normally sleep fully clothed in the hedge beside your quarters?"

Frozzleforth sprang to his feet and glared at the flight surgeon, his face an angry red. "Your gestapo tactics do not amuse me, doctor! Is that all?"

"Yes, major, that's quite enough. Good luck." He watched the tall aviator wheel and tramp through the door. "You'll be needing more than luck, if I know Colonel Bustwell!"

Note: The flight surgeon did not reckon with the guardian angel who looks after the welfare of the world's greatest. On the same day Frozzleforth left the flight surgeon's office, his battalion and the field hospital were deployed to a new area. En route, two trucks carrying all records slipped off a pontoon bridge and sank in 10 feet of water. Their contents were soaked into an undecipherable pulp.

UH-1H AIRCRAFT COMMANDER: "We left the airfield, flying low level up the bay to avoid the traffic taking off across our flight path. While flying parallel to the airfield, I wanted to contact coastal center to open flight following. I was flying left seat and the pilot right seat. I was on the controls. Our airspeed was about 90 knots and we were flying at 15-30 feet absolute. The pilot was dialing in the last two digits of coastal center FM.

"I looked down at the radio for an instant, perhaps 1-3 seconds. When I looked out again the water was very close and I heard a ripping noise as the skids hit. Then the cabin was full of foaming water.

"I recall being upside down at one point, then coming upright again. I released my safety harness and kicked upward. Something was caught at my left shoulder. Then I came free and surfaced. There was nothing in front of me or above me. I don't recall removing my helmet. I stripped off my gloves at the surface . . ."

Investigation board narrative: ". . . The aircraft came to rest on its right side on the bottom of the bay in 20 feet of water. One or two small fires were seen by witnesses immediately after the crash. As JP-4 from the ruptured fuel cells ignited, the area around the wreckage became engulfed in flames.

"All personnel surfaced and were active except the pilot, who appeared to be unconscious. The crewchief was apparently thrown from the aircraft.

1-3 SECONDS

1-3 SECONDS

He found himself in the water with no recollection of how he escaped. He stated that he had not worn his seat belt at any time during this flight and that he was not accustomed to using it at all. The crewchief could not swim but found his flak jacket assisted him in staying afloat.

"One passenger held on to a floating duffle bag until rescue. One passenger could not swim. The aircraft commander went to his aid but had to let him go when the fire erupted. His body was found 2 days later. Another passenger was assisting the pilot, who was probably unconscious, but had to release him to escape the burning area.

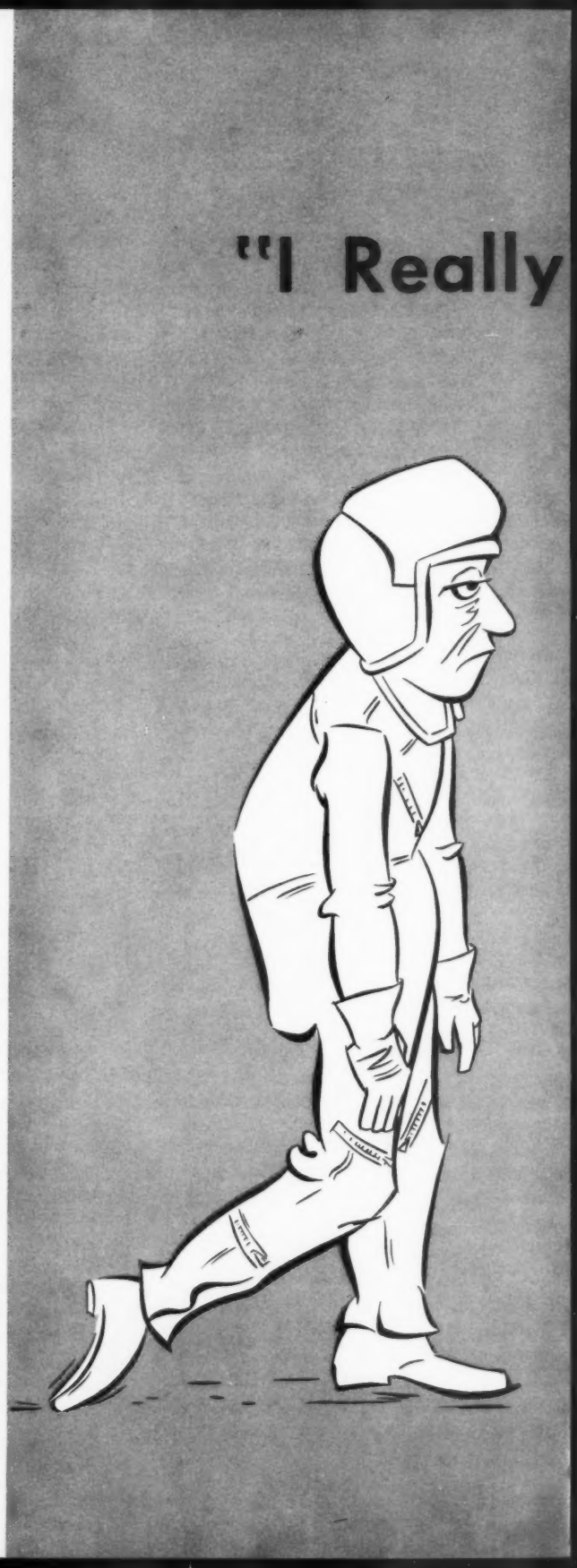
"A rescue helicopter arrived 4 minutes after the crash and picked up four survivors. A boat picked up the other two. The pilot died the following morning.

"It is of interest to note that the flak vests which were worn were of benefit to the crewchief and a passenger, both nonswimmers, and also assisted the gunner. One of the passengers could not take off his shirt because of the wet sleeves which were rolled up above the elbow. He was unable to take his boots off due to the wet cloth laces which were difficult to untie . . ."

Analysis: ". . . The aircraft crashed while flying low level over the bay while both pilots' attention was diverted inside the cockpit . . . The pilots were evidently concerned that they should remain well clear of the control zone. Their misconception of remaining clear was evidenced by remaining as low as possible, directly up the center of the bay. This was a gross error in judgment and one which placed them in a perilous position. Had the pilots contacted the tower, they could have obtained a safe clearance route . . ."

Flight surgeon: " . . . The selection of a flight path unnecessarily far from the shoreline of the bay, as well as the unnecessarily low altitude, is in itself evidence of inexperience and faulty judgment on the part of the aircraft commander. In addition, it indicates a poor quality or lack of standardization training, plus poor judgment on the part of the unit which published the orders designating this young aviator an aircraft commander.

"Further indications of the lack of safety consciousness on the part of the crew, and therefore, perhaps of the unit, were failure to roll sleeves down, wear flight gloves, and provide water survival jackets for each occupant. Each of these items is well established policy at all levels of the brigade. Yet there evidently had not been sufficient local command emphasis on these aspects of safety to ensure compliance . . ."



Didn't Feel up to Flying"

UH-1D PILOT: "'. . . At about 0900, I was flying into an LZ. On final, I had to decelerate as the preceding aircraft had not left the LZ. As I approached ¼ mile on final, the LZ was clear. From 250-300 feet, the approach looked all right. I had my sight picture and what appeared to be a good rate of closure. I didn't have to make any major attitude changes from the deceleration to provide traffic separation. I recall holding about 13-20 psi on torque, but I don't remember the N_1. I know the N_2 was in the 6400-6600 range.

"I was tired and preoccupied with where I was going to land. My attention narrowed to that spot. However, all through the approach, I felt no misgivings about a safe landing.

"All at once, at about 15 feet, as I was starting my final pitch pull for touchdown, I heard the low audio horn. My airspeed had zeroed, though I had some groundspeed. I was startled to realize my predicament. I felt that I had no room to go around as the aircraft had started to settle straight down. To minimize injuries, I hoped to be able to flare and zero groundspeed and hit level. Luckily, I did. I was worried about the ground troops and the rest of the crew. There were no injuries.

"I had only slept 2 hours the previous night because of a late mission cancellation. The aircraft commander and I had been flying the aircraft the previous day and night and were scheduled to be released that morning for the rest of the day at 0700. Had I been feeling better or more alert, I would have been more aware of the conditions which led to the crash.

"I finally got to bed about 2300. I had a restless night and a 0200 wakeup. What with a rather strenuous night mission from 0400-0700, *I really didn't feel up to flying.* I tried to do my duty as best I could and overextended myself. A schedule of flying two nights and a day is unsettling. Compounded with tired crews, simple actions become critical. . . ."

Investigation officer's narrative: ". . . To the pilot, it did not appear that he needed to go around. Of course, no go-around was attempted after the aircraft was at 15 feet, with zero airspeed and falling rpm. Since the pilot had very little sleep during the previous 48 hours, his judgment was poor. A go-around could have been made prior to the rpm loss at approximately 150-200 feet. He was slow to react due to fatigue. If normal sleep were afforded, I believe accidents of this type could be prevented.

"Until this time, the pilot had been regarded as one of the better aviators in the company. He was the honor graduate of his flight class. . . ."

Cause factors: "Poor judgment by the pilot and aircraft commander, resulting from fatigue.

"Failure of the aircraft commander to monitor the approach.

"Failure of the pilot to react early enough with application of power and increased rpm.

"Failure of the pilot to recognize a deteriorating situation and to initiate a go-around."

Second indorsement to letter of transmittal: ". . . The real cause of this accident in my opinion is lack of application of good command supervision. A commander must know the condition of his subordinates and whether they are capable of performing assigned missions . . ."

Statement of appointing authority: "The investigation of this accident has been summarized and reproduced for distribution to all assigned aviators. The following points were emphasized:

"The need for increased vigilance and widening of the margin for error at times when pilots have insufficient sleep or have been on duty continuously in excess of norms prescribed by AR 95-17.

"The fact that aircraft with turbine engines have response time lags which vary by model has been stressed. Pilots must anticipate the maximum power lag and begin to apply collective pitch well in advance.

"The importance of aircraft commanders taking action early enough to prevent mishaps."

OH-23G PILOT: ". . . I continued to fly towards the pass. On entering the pass, I made a PIREP, giving the ceiling in the pass as approximately 1,000 feet above the ground and visibility approximately 2 miles in haze.

"Approximately 2-5 minutes later, flying at approximately 500 feet above the ground and to the right of the highway, I encountered severe turbulence. On several instances the aircraft was thrown up and down so hard that we were in a weightless state and then slammed back into our seats. Because of the ceiling, I could not go up. I elected to go down and attempt to get out of the turbulence. I was afraid if I stayed in the turbulence, the aircraft would sustain structural damage.

"I lowered the pitch and started to descend at approximately 500-700 feet a minute. At that time I regained control. About 30 seconds later, I again encountered severe downdrafts and turbulence. There is a possibility that I had blade stall, but I am not sure. During this time I again lost momentary control of the aircraft. I was trying to control rpm and at this point it seemed the right side of the bubble exploded. My first thought was that I had a bird strike, but then I realized it couldn't have been. I did not know what I had hit. My radio was pushed against my pedals.

"I kicked the radio free and made a 180° turn. I saw the broken powerline and realized that I had hit it. I landed to the side of the road. I am positive that if I had not encountered the severe turbulence, I would have cleared the terrain, which consists of hills and cliffs, by a minimum of 450 feet.

"When I first encountered the turbulence, I moved to my left because it gave more altitude between me and the ground. The top of the hill was in the ceiling and sloped down past the road at a steep angle. I was on the leeward side of the hill and this put me into severe downdrafts and turbulence."

The wire strike caused only minor damage, requiring a new bubble. The pilot and passenger were not injured.

Witness: "About 11:00 AM, I stepped out on my front porch. I saw a helicopter coming up the left side of the highway. He appeared to be flying about the same altitude all the way past my place. When he came even with my house, he cleared the corral about 10 feet or less. I am very sure about his clearance above the corral because his skid was on line with my eyes and the tree next to the corral. After he had passed, I heard two loud pops. When I stepped back inside, the power was out . . ."

Witness: ". . . I heard the helicopter flying above my car for 4 or 5 minutes before it passed overhead. This would be about a mile before it hit the wires. It was about 700 feet from the wires when I first saw it, flying at an altitude of 40 feet or less. My speed at this time was 50 mph. I would estimate its speed at 60-70 mph. When it passed overhead, it seemed to be gaining altitude. Just before it hit the wires, it wavered and wobbled, losing some altitude. It seemed it would have missed the wires if it had not had trouble at that point . . ."

Investigation officer's analysis: "The first basic conflict appeared in the altitude given by each witness of the aircraft prior to the accident. The first witness to observe the aircraft near the accident scene was standing on his porch when he saw it pass in front of his home. It passed less than 100 yards from him and he could positively locate it on a picture as having passed directly over his corral at less than 10 feet altitude. The corral was ¼ mile from the wire strike. One witness observed the aircraft approximately halfway from the corral and the wire strike and estimated its altitude at 40 feet above her car. Another witness saw it coming around the curve just prior to the wire strike, and

he estimated its altitude at 40 feet above the ground.

"The pilot and passenger both estimated their altitude prior to the accident at 450-500 feet. Based on the three witnesses' estimates of altitude, I concluded the aircraft was flying low level at least 1 mile before the accident.

"The second point that conflicted was whether the aircraft encountered turbulence prior to the wire strike. One witness was very certain that the aircraft did encounter difficulty just prior to the accident, supporting the pilot's statement on this point. It is a well known fact that the pass is seldom without turbulence, and I concluded the pilot was correct in assuming he had encountered either a wind gust or turbulence just before the wire strike. I do not consider this as a cause factor, as his altitude was already minimal for the conditions he knew existed at the time.

". . . There were no mechanical malfunctions evident in the aircraft, supported by the fact that the aircraft was flown after the accident. Weather, in my analysis, could not be determined as a cause factor, although it existed in the form of low ceiling and turbulence. The pilot was aware of all conditions prior to the accident."

Cause factors: "Aircraft was operated at an altitude that would not allow clearance of obstructions under existing flight conditions.

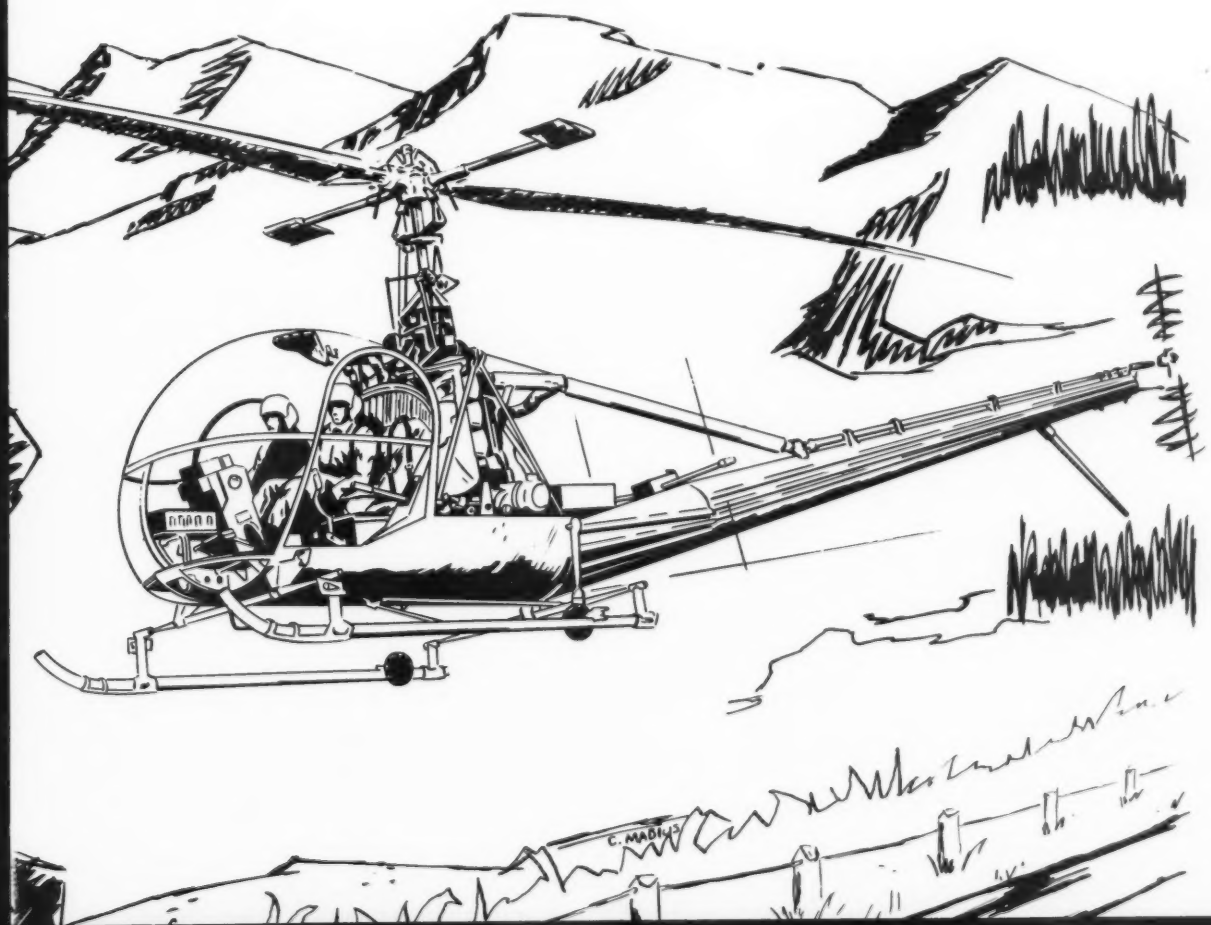
"Lack of 'division of attention' while experiencing flight control problems prevented the pilot from seeing the wires in his flight path.

"Pilot encountered severe turbulence bordering on limitations of aircraft and pilot. Corrective action was not started in time to avoid placing aircraft in danger."

Recommendations: "All pilots, especially those returning from overseas areas, be given continual unit orientations on the hazards of low level flight in unfamiliar areas.

"All pilots, combat zone returnees in particular, be cautioned repeatedly about continuing missions under adverse conditions when urgency is not indicated.

"Briefings be given on types of turbulence, avoidance, and effects on flight controls and structures."



WHY GAS TURBINE ENGINE FAILURES?

Ted Kontos

IF SIR ISAAC NEWTON had been content with his discovery of gravity, Army aviation would never have advanced to its present state. But Newton was persistent. One result was the formulation of his third law of motion which, in its simplest form, states that for every action there is an equal and opposing reaction.

Any youngster who has secretly satisfied his yearning to shoot his father's 12 gauge has tested this law and can certify its validity on two counts—immediately after squeezing the trigger and again when his father found out. What's important is that Newton put this natural law into words and these words had an immense influence on modern technology. The gas turbine engine is an example.

We might well question the merits of the gas turbine engine compared to a reciprocating type. It is more difficult to make, costs more, uses more fuel, doesn't accelerate as rapidly, and generally has a shorter life. Despite these shortcomings, it is rapidly

replacing the piston engine.

A reciprocating engine represents a marriage of a conglomeration of parts—cylinders, pistons, piston rods, crankshaft, cams, valves, push rods, magnetos, distributors, leads, sparkplugs, etc. These must be timed so that events necessary for engine operation —induction, compression, ignition, combustion, and exhaust—can occur at precisely the right moment in each cylinder. Because of its complicated innards, even the best reciprocating aircraft engine can only produce one horsepower for each pound of weight.

In contrast, the gas turbine engine is extremely simple. Basically, it consists of a compressor rotor and turbine wheel mounted on opposite ends of a shaft which is free to rotate within an open cylinder. During operation, all events occur simultaneously. There are no timing problems. By variations in design, the speed of driven components, such as helicopter rotors, can be operated and controlled independently of shaft speed. The result is a simple, light, highly versatile engine, capable of delivering a great amount of power for its weight.

Though development of the gas turbine has eliminated many problems of the piston engine, it has given rise to new ones. Because of high operating speeds and temperatures, airflow must be unrestricted. Lubrication must be faultless. Rotating components must be manufactured to critical tolerances, carefully balanced, and kept free of defects. Fuel metering devices must function precisely. Starting, operating, and shutdown procedures, as well as all maintenance and inspections, must be exactly performed by strict specifications. Contamination of engine components, oil, and fuel systems cannot be permitted. Once out of the hands of the manufacturer, engine longevity and reliability depend largely on those who use and maintain it.

What kind of a job have *we* been doing? Last year (CY 1967) more than 300 mishaps resulted from failure or malfunction of T-53 engines installed in UH-1 helicopters. These occurred at an average engine operating time of 451 hours. Costs for premature engine overhauls totaled approximately $1½ million. Materiel failures accounted for approximately 26 percent; foreign object damage (FOD), 23 percent; bearing failures, 18 percent; compressor stalls, 16 percent; improper maintenance, 13 percent; and high egt's (excluding compressor stalls), 4 percent.

Costs, lost time, aborted missions, and safety of flight hazards caused by engine failures present a strong argument for preventive action. Based on these statistics, it would appear the fastest results could be obtained by concentrating on the six general areas. We might be tempted to direct materiel and bearing failures to the manufacturer for cures; compressor stalls and high egt's to pilots; FOD to cleanup personnel; etc. Unfortunately, the answers aren't this simple.

A closer look at cause factors shows that approximately 9.5 percent of all materiel failures reported were due to improper maintenance. In one instance, a turbine wheel was improperly assembled to its shaft. This engine failed approximately 15 hours after maintenance was performed. In another instance, an improperly made weld on the inner shroud failed, causing the shroud to drop and shear the N_1 blades. Overtorquing an oil filter housing attaching bolt caused bolt failure and loss of oil.

Maintenance factors are known to have caused approximately 8.5 percent of all FOD failures. Improper inspection and repair of loose cowl fasteners accounted for many. Tools left in engines, and improperly fastened intake screens caused others. Maintenance factors were also responsible for approximately 8 percent of the compressor stalls. Improperly adjusted bleed air bands and fuel control units were the principal causes.

Additional information alters the first grouping of engine failure cause factors in this way: materiel failures, 23.5 percent; improper maintenance, 22 percent; bearing failures, 18 percent; foreign object damage, 18 percent; compressor stalls, 14.5 percent; and high egt's (excluding compressor stalls), 4 percent.

These percentages could be altered still further. Excluding high temperatures from compressor stalls, records show that approximately 4 percent of the engine failures were attributed to high egt's. Yet, a more detailed study of 67 accidents and 248 other mishaps established excessively high operating temperatures as the cause or contributing cause of two major accidents and 18 other mishaps. In addition, overtemps are strongly suspected to have been contributing factors in 36 additional accidents and 53 other mishaps. Based on these findings, it is possible that overtemps may have played some part in as many as 25 percent of the T-53 engine failures. None of these overtemps were reported or recorded at the time the overtemps occurred. They were only brought to light by after-the-fact engine analyses.

It is apparent that our statistics do not accurately pinpoint problem areas. They only show our failures. For an effective safety program, specific cause factors must be known. Without these, we can only hope for marginal improvement. Fewer than one-third of all T-53 engine failures reported during CY 1967 listed suspected or confirmed cause factors. The remaining two-thirds, more than 200, were reported as "engine failure," "internal engine failure," or

simply "failed in flight." *No supplemental information was submitted.*

It doesn't require a trained specialist to see the flaw in our safety program. Lack of accurate information concerning specific cause factors results in wasted effort, time, and money.

One of the best analogies to our gas turbine engine problems of today concerns engine problems of nearly a quarter of a century ago. The engine was the newly developed R-3350, used on the B-29. Units stationed in the Pacific theatre clamored for help. Engines were failing at an alarming rate. Parts were used faster than they could be delivered. Severe backfiring caused inflight fires, destroying aircraft. EIRs were submitted with machinegun rapidity. Amidst all this confusion, one B-29 unit had no engine problems. Investigation showed that while others were blaming failures on design deficiencies, this unit, spurred by an energetic maintenance officer, had done something about them. They recorded and analyzed failures, determined causes, established engine needs, developed cures, and set up a program to ensure the cures were applied.

While other engines might continue to function satisfactorily with marginal spark plugs, leads, and other minor defects, the R-3350 would not. Ignition timing, carburetor adjustments, and valve clearances had to be exact. Overboosting had to be avoided. Discrepancies had to be noted and reported for immediate identification and correction—before failures could occur. In short, the R-3350 was not different from other engines, but its requirements were far more critical.

One Army unit has taken steps to produce a similar program. The following was taken from the January 1968 issue of HAWK WHIP SAFETY, 1st Aviation Brigade. Like the B-29 unit, they demanded and found answers for the all-important WHY? Here's what they had to say about T-53/T-55 engine failures:

A comprehensive study of 1,159 engines removed to depot during a 17-month period revealed that the causes of trouble in 50 percent of the cases were attributed to sand and dust erosion and foreign object damage. Operator and maintenance error were responsible for an additional 10 percent, and 17 percent were due to actual engine component failure. This suggests four general areas in which improvement can and must be achieved. First, in closer supervision of personnel; second, in greatly expanding the scope of our preventive maintenance program; third, in expediting the completion of on-the-line maintenance and repairs; and fourth, in effecting better handling of engines and components returned to high echelons for repair and overhaul. Specific problem areas, causes, and results, which can be largely corrected at the organizational maintenance and operational level follow.

FOREIGN OBJECT DAMAGE

Causes:

1. Poor cleanup of inlet area after maintenance.
2. Failure to periodically inspect and replace worn Dzus fasteners and washers on inlet screen.
3. Foreign objects deposited on deck walkways during maintenance. These objects (bits of safety wire, pebbles, rivets) are carried by muddy shoes.
4. Unpoliced litter in hover and landing pad areas.

Results:

1. High operating temperatures and hot end damage.
2. Loss of power and possible failure.
3. Increased maintenance allocations and downtime.
4. Increased engine rejections and engine shortages.
5. Subjects flight crews to undue risks.

SAND EROSION

Causes:

1. Hovering in loose sand areas.
2. Formation takeoffs in sandy areas.

Results:

1. High operating temperatures.
2. Progressive loss in power, reducing mission capabilities.
3. Progressive increase in fuel consumption.
4. Reduced surge margin and/or compressor stall.
5. Premature deterioration of hot end parts.
6. Reduced engine life.
7. Increased engine shortages.
8. Increased maintenance workload.

OIL STARVATION

Causes:

1. Poor servicing procedures (system contamination).
2. Clogged filters and strainers.
3. Incorrect filter cleaning and/or maintenance.
4. Maintenance errors (loose connections, incorrect torquing of filter bolt, line restrictions).
5. Infrequent oil changes when excessive carbon content is noted (by color of oil).

Results:

1. Main bearing and subsequent engine failure.
2. Undue reduction gear wear and/or failure.
3. High oil and bearing operating temperatures.
4. Contributed to engine shortages.

PREMATURE PART DETERIORATION

Causes:

1. Engines trimmed above rated N_1 speeds.

lack of accurate information concerning specific cause factors results in wasted effort, time and money . . .

2. Continuous operation at higher than normal N_2 speed.
3. Unnecessary operation in emergency fuel mode.
4. Excessive aircraft gross loads.
5. Dirty, damaged, or eroded.
6. Excessive internal or external air leakage.
7. Clogged fuel injectors due to poor maintenance during hot end inspections.
8. Engine shutdown before temperature stabilization.

Results:

1. Increased maintenance allocations and efforts.
2. Parts shortages and EDPs.
3. Potential component and/or engine failure.

OVERSPEEDS AND OVERTEMPERATURES

Causes:

1. Operation in emergency fuel mode.
2. Governor failure.
3. Control rigging and/or droop cam.
4. Flight attitudes.
5. Short shaft failures.

Results:

1. Excessive aircraft down time for overspeed inspections.
2. Overstressing of engine and airframe components.
3. Parts replacement, contributing to parts shortages and EDPs.

HOT STARTS

Causes:

1. Low batteries.
2. Use of emergency fuel mode.
3. Restricted engine inlets.
4. Malfunctioning engine components.
5. Improper starting techniques.

Results:

1. Internal hot end damage and/or failure.
2. Increased maintenance allocations.
3. Increased aircraft down time for unscheduled inspections.
4. Contributed to parts shortages and EDPs.

PROBLEM AREAS AND PREVENTIVE MAINTENANCE SUGGESTIONS

Inspect the engine inlet often. Inlet guide vanes cannot be effectively cleaned by walnut shells or water. They must be hand cleaned with a brush and solvent. Recommend this area be cleaned at 100-hour minimum intervals, or more frequently if required.

The main fuel hose (from airframe to engine) quick disconnect has caused a number of engine flameouts due to not being completely locked in place. The locking pins must be protruding for the disconnect to be locked. Flameouts have occurred in 2 minutes, 5 minutes, and as high as 20 minutes. This would depend on how long before the disconnect became completely disconnected from normal airframe vibration.

Insist that all open lines, fuel control parts, etc., are always capped or covered to prevent contamination. This is definitely a problem area. A roll of aluminum foil makes a very excellent substitute for caps. A small piece, hand pressed over fittings or hose ends, serves as a fairly positive barrier against dust, dirt, bugs, etc.

A survey indicates that approximately 40 percent of starting problems are due to weak batteries.

Customer air bleed hoses are a source of air leakage, which in turn is responsible for high egt and low torque and component deterioration.

The customer air bleed hose (on the UH-1B model only) can usually be found interfering with the fuel control throttle rod from bell crank to power lever. This often causes enough interference to prevent the power lever from attaining maximum travel, thus causing low N_1 speed and low power.

The bleed band teflon tapes have a habit of losing their bonding, coming loose and bunching up close to the actuator. This sometimes allows enough leakage at the bleed band to cause low power. Remove it completely and readjust band as necessary in accordance with existing instructions.

Always take into consideration the operating altitude and ambient temperatures when a "low torque" discrepancy is submitted. Many pilots are unaware of the losses due to these factors. In many instances a "low torque" indication is a correct indication.

Make a habit of checking airframe and fuel control rigging on all low power or power decay discrepancies.

An easy method to check operation of the bleed band actuator (L-11 and L-7 only) is to disconnect the ¼" air bleed line from the actuator to the fuel control and then block this port with a gloved hand, or other suitable instrument. Operating at flight idle or over, the band will snap closed each time this port is blocked and snap open each time pressure is released. Bear in mind that this only checks out the actuator for operation and not the controlling system which is in the fuel control. However, it will immediately determine whether you should re-

place the actuator or the fuel control when trouble shooting an inoperative bleed band condition.

RULES OF THUMB WORTH REMEMBERING —T-53

¾ psi torque is lost with each 1,000 feet of density altitude

1 psi torque is lost with each 2° C rise

1% N_1 (Mil range) is approximately 45 shp (Std day)

1% N_1 changes egt approximately 15° C

1 psi torque is worth approximately 23 shp (upper ranges)

ENGINE TROUBLESHOOTING

The AVCO Lycoming reliability and maintainability engineers calculate that about 9 percent of the engines returned to depot were removed for reasons that could not be substantiated at overhaul. In addition, 15-20 percent of engines returned for all of the various causes stated need not have been returned to the depot. They could have been repaired at the lower echelons of maintenance. In other words, over 25 percent of all engines removed for depot overhaul might have been repaired on-the-line or in the immediate support area. Obviously there is much room for improvement in troubleshooting malfunctioning engines, in identifying the causes of failure, and in properly tagging the engines when they are sent to higher echelons.

The secret of effective troubleshooting or in isolating problems is to obtain as much information and as many instrument readings as possible, then correlate one reading against the other. Avoid hasty conclusions which often result in unnecessary part replacements. In most cases, this type of action merely depletes existing stocks and invites parts shortages.

When a malfunction is evident, sit down and spend a few minutes evaluating the discrepancy. There are numerous problems which, by the process of elimination, can be isolated to two or three possible causes and these causes can then be further isolated by a few simple operational checks.

"High egt" is a common complaint, which in many cases is merely a high egt *indication* due to a faulty indicator.

If, during a maximum power check, egt indicates "high" but N_1 speed and torque indicate "normal," it would be justified to suspect the egt indicating system for being discrepant. Before replacing a costly fuel control or disassembling the hot end of the engine, check this system, using the Jet-Cal analyzer. If egt indicates high and both N_1 speed and torque also indicate high, it should be obvious that the only problem is that the fuel control is overtrimmed and the engine is performing per demand.

To illustrate further—if egt indicates "high," but N_1 speed is normal and torque is low, then the two abnormal indications (high egt and low torque) definitely indicate a genuine problem exists. It might be well to mention that there are not less than a dozen causes that may be responsible for the malfunction, and here is where systematic troubleshooting will pay off.

Consistent with *probability,* perform the easiest inspections and checks first. Examine the records to determine if any previous maintenance may have had a direct bearing on the existing discrepancy—a hot end disassembly, a bleed band actuator replacement, a disconnected anti-ice valve, etc. Before operating the engine, check the air inlet for obstructions, dirt buildup, or foreign object damage to the compressor. Check the exhaust area for blockage, excessive turbine tip clearances, or burnoff. Check the bleed band for security.

If all appears normal, operate the engine and check for bleed band operation, anti-ice and combustor drain valve for proper operation, air leakage at the bleed band or customer bleed hose for possible rupture, etc.

Finally, it may be necessary to disassemble and inspect the hot end for internal damage. Burned fuel vaporizers, burned N_1 or N_2 nozzles, liner burnthrough, a leaking second stage seal, etc., can all cause high egt, with low torque.

It may be well to mention that the fuel control is not usually responsible for this type of discrepancy.

Make use of the published troubleshooting guides in applicable manuals. Keep in mind that a few hours spent in logical troubleshooting is far less expensive and easier on the supply system than replacing parts at random, or removing and shipping an engine halfway around the world and back again for an unnecessary overhaul.

Recommendations follow for various maintenance levels.

OPERATIONAL LEVELS:

Allow a minimum of 2 minutes at idle rpm for engine temperatures to stabilize before shutdown. This will prevent cracking and warping of hot end components.

When checking emergency fuel mode for proper operation, follow the operations handbook. This operation is performed at 70 percent N_1 speed. Switch over at higher N_1 speeds can cause overtemperatures and overspeed. Also avoid rapid throttle movements when operating in emergency.

Preflight engine inlet areas for grass, leaves, or weed buildup. This buildup usually occurs at the

5 o'clock engine position and is hidden by the lower inlet housing strut.

If a problem is suspected, try to obtain as many engine instrument readings as possible to aid in troubleshooting.

Avoid excessive hovering in sandy or loose foliage areas.

Report all hot starts, overspeeds, hard landings, instrument fluctuations, etc. This information, if left unreported, can lead to failures.

Avoid improper starting techniques.

ORGANIZATIONAL LEVELS:

Remove complete inlet screen at 100-hour intervals and clean inlet area and inlet guide vanes.

Under adverse environmental conditions, such as those found in areas of Vietnam, remove and clean the main oil filter and the last chance bearing strainers each 25 hours of operation. The maintenance officer has the prerogative of increased frequency if necessary. Also, as directed, change oil every 100 hours.

fewer than one-third of all T53 engine failures reported during CY 67 listed suspected or confirmed cause factors . . .

Avoid loose grease in the aircraft transmission area. Excessive grease in and around the short shaft is ingested into the engine, causing dirt buildup, with accompanying loss of power and high operating temperatures.

Ensure that all inlet area ducting and screens have no loose fasteners. Check for bits of safety wire, screws, rivets, etc.—especially after maintenance has been performed in this area.

Avoid overtrimming an engine for more power than its rating. This leads to shortened TBO life and excessive parts replacement. It can also lead to mechanical failure. If a genuine lack of power exists, do not uptrim the fuel control. Instead, troubleshoot and locate the cause of the power loss.

Inspect for compressor FOD daily. This requires a good flashlight. Look at each first stage rotor blade carefully. If compressor is too dirty for a good inspection, clean it as prescribed in the TM.

Avoid hasty fuel control rejections as causes of malfunctions. Experience indicates that more than 50 percent of returned fuel control units are found to have no discrepancies.

DIRECT SUPPORT LEVELS:

Requisition and make use of special tools. If a No. 3 bearing seal is leaking, avoid rejecting the entire turbine assembly. Disassemble the unit and replace the seal only. The TMs provide step by step instructions for this repair.

When performing a hot end inspection, wrap all parts to ensure cleanliness. This especially applies to bearings, oil seals, fuel components, etc. Remove excessive coke and carbon buildup on fuel vaporizers, baffles, and other areas that affect airflow or cooling.

Make use of and follow the accepted inspection limits, as stated in TB 55-2800-200-30/1. Do not reject a component that is allowed a given size crack limit just because the existing crack is getting near the published crack limit.

Avoid forwarding engines with compressor foreign object damage. The upper compressor case half can be removed in less than 2 hours. At this time, a decision can be made about repair possibilities. Engines received at ARADMAC indicate that many could have been repaired at field level.

When it becomes necessary to forward a component or engine to the next echelon level, preserve the component or engine in accordance with prescribed instructions. Ensure that no water remains in engine cans. Many engines received at ARADMAC are severely corroded because little or no corrosion preventive measures were taken.

Tag all components with as much information as possible to aid the receiving unit in proper disposition.

GENERAL SUPPORT LEVELS:

Make full use of the mobile test stand, TE 12062 (old No. LTCT 744). This equipment can definitely reduce returns to overhaul.

More compressor FOD engines can be repaired. Remember that five sets of blades per stage can be replaced, in addition to repairing an unlimited number of blades within blending limits.

Welding repairs to many components, such as exhaust diffusers, combustion chamber liner brackets, and air deflectors, will extend the life of these components and reduce shortages.

More concern and investigation should be given to the nature of the discrepancy before a final return to overhaul decision is made.

It's obvious the 1st Aviation Brigade has recognized and analyzed its gas turbine engine problems. Armed with specific answers to WHY?—half the battle in any prevention program—this unit is now equipped with the know-how to provide *"equal and opposing reactions."* Sir Isaac can rest in peace, secure in the knowledge his law remains inviolate. Can he rest equally secure with your unit?

PEARL'S
personal equipment and rescue/survival lowdown

Dear Pearl:

I have been in Vietnam now about 7 months and there are two items of Army aviation equipment that have literally given me headaches.

The first is the armored chest protector that the helicopter pilots wear. I, as well as some other people I've talked to, have been involved in aircraft accidents. All of us have sustained injury to our chins and mouths due to the chest protector. Would it be possible to put some kind of padding on future and even the present models of the chest protector along the top edge to help absorb some of the shock when it crashes up into your face? I know I personally would have climbed out of my wreck without a scratch if it hadn't been for the chest protector.

The second is the new APH-7 ballistic flight helmet. I should start out by saying the only things I like about it are the double-jointed microphone boom and the fact that it will stop fragments. The coiled type plug-in cord does nothing except get tangled in all manners of equipment in the cockpit. The old style straight cord which came directly out of the back of the helmet is far superior. The types of sizing pads they're packing with the APH-7 don't accomplish their purpose. They're too thin to start with and after a few days' wear they're practically paper thin. The old type pads packed with the APH-5 maintain their shape and I believe are much better. The chin and nape pads on the APH-7 aren't as good as the ones on the APH-5. With their sharp edges they are extremely uncomfortable to pull up snug the prescribed way. When they get damp, the cover over the foam rubber curls toward the center and becomes sticky. Finally, the plastic cover which hides the visor seems to be badly formed in that on all the APH-7 helmets I've seen, the visor gets badly scratched and comes off its guides when pulled down.

Would you please look into these things I've mentioned and see if anything can be done about them.

WO Robert B. Poage, Jr.
1st Aviation Brigade

Dear Mr. Poage:

Your proposal is certainly worthy of consideration, so I am forwarding your letter to Natick Laboratories, the agency responsible for the development of this type equipment. They are presently involved in designing an integrated flak/small arms protective vest so your proposal is very timely. A recent study on crashworthiness of aircrew protective armor conducted by Aviation Safety Engineering and Research (AvSER), Phoenix, Ariz., established the following: "The advantage of tightly worn armor and occupant restraint harness over loosely worn armor and restraint harness is considered to be significant based on tests conducted during this program and previous experience with restraint systems at AvSER. The tight, properly worn armor stayed closer to the dummy and did not flay around the neck and face area, especially during vertical impacts."

In reference to your comments regarding the ballistic helmet, representatives from Natick Laboratories and the U.S. Army Aviation Materiel Command (AVCOM) were in Vietnam from September to December 1967 specifically to apply the following modifications to the ballistic helmet:

a. Replace the plastic screws in the visor housing assembly with steel screws.

b. Replace the rectangular pad with the APH-5 chin pad.

c. Replace the defective fitting pads.

d. Replace the nape strap tie string with one that has been heat-set to minimize elongation when the nape strap is tightened.

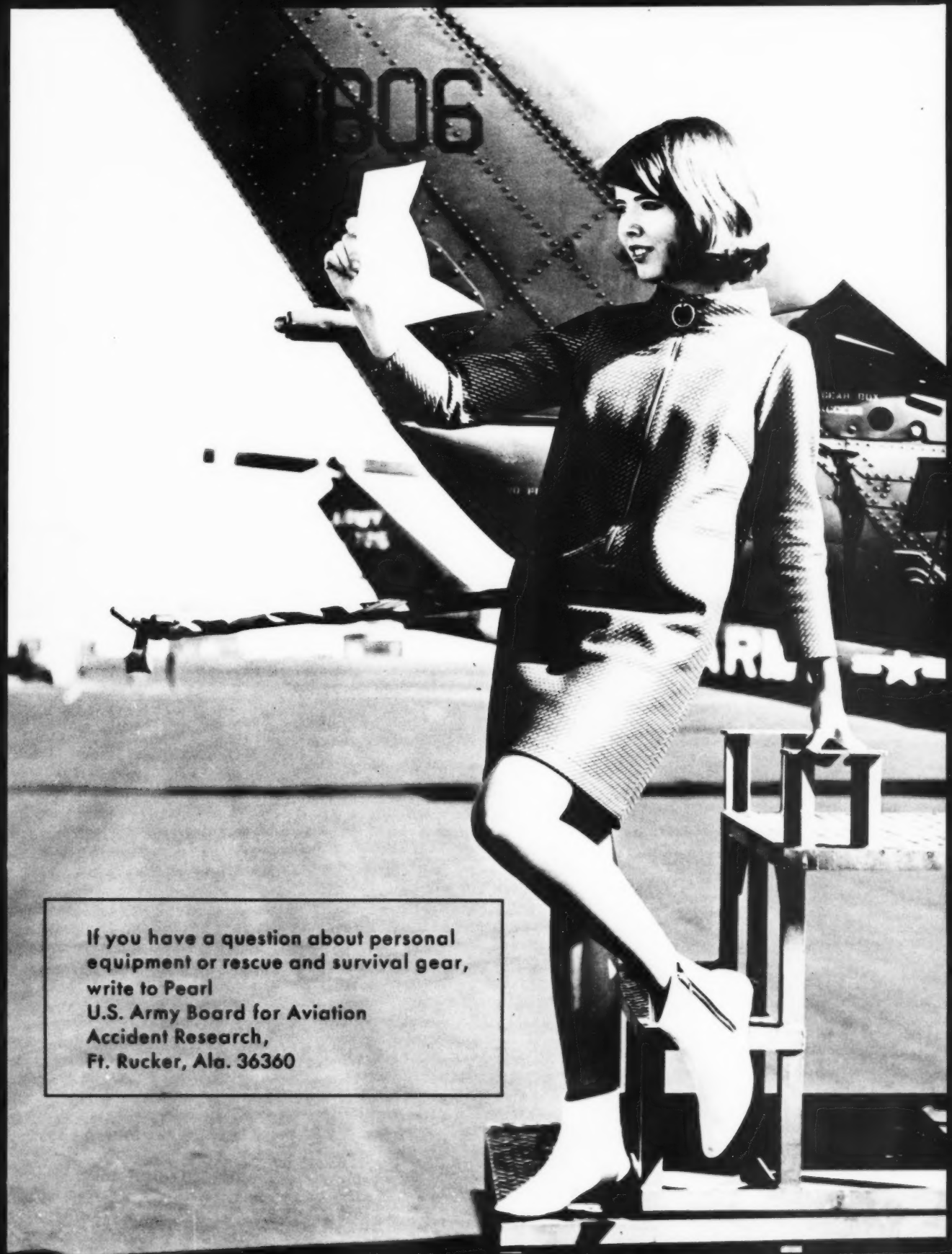
e. Cut excessive styrofoam from around earphones and remove coils of earphone springs as required for fitting.

f. Fit helmet, as required, using only the inner comfort (high density) pad, if necessary.

In addition, at the completion of the trip, the Natick Laboratories' representative recommended the outer sizing pad of the ballistic helmet be provided with a leather cover similar to that currently used with the APH-5 series.

I hope I've satisfied your inquiry. However, to establish your complaints officially, I recommend that you submit an Equipment Improvement Report (EIR) on DA Form 2407 in accordance with paragraph 3-7.4, page 3-48 of TM 38-750.

PEARL



If you have a question about personal equipment or rescue and survival gear, write to Pearl
U.S. Army Board for Aviation Accident Research,
Ft. Rucker, Ala. 36360

HE HAD TO GO

INVESTIGATION board narrative: "At approximately 1820, a UH-1D, with five persons aboard, departed an LZ. The mission was to fly to another LZ and have the command and control radios removed, then to proceed to an airfield and remain overnight. The pilot was advised by the crew he relieved that weather along the coast was marginal. He had also been briefed by the operations officer about the weather and actions to take if he encountered weather.

"The aircraft landed at approximately 1900 and departed at approximately 1930 for the flight to the airfield. At the time of departure, the pilot was advised by the battalion officer to remain overnight at the LZ because of the weather along the coast. The pilot stated *'he had to go.'*

"The exact route from the LZ to the airfield is unknown. Sometime between 1930 and 1945, the aircraft encountered IFR conditions, low level, along the coast. The pilot climbed into the weather and continued on toward the airfield. At 1945, he requested a GCA to the airfield. He worked with the GCA for approximately 12 minutes with no radar contact. He then made a call, requesting any station with DF or radar capability to help him locate his position. Another airfield answered on guard and gave the aircraft their GCA frequency. Radio contact was established.

"When asked if the aircraft had any homing capability, the pilot answered that his ADF was not operational, but that he had FM. No attempt was made to use the FM homing equipment . . .

"At 2006, the pilot again transmitted on guard, requesting DF or radar assistance, and said that he was flying triangular lost patterns . . . Another airfield contacted the aircraft and offered assistance through their approach control. All radio traffic was now on guard . . .

"At 2020, the pilot announced that he had 15 minutes of fuel remaining. At 2032 and again at 2036, he announced 10 minutes of fuel remaining. At 2043, the pilot said his fuel was getting critical. At 2053, he announced that he was going to let down because he had 5 minutes of fuel. His heading was then 240°. At 2058, the pilot announced that he had lost fuel pressure and was yawing to splash fuel in the tank. At approximately 2104, he made his last transmission, stating that he had visual contact with the water and was flying low level just prior to ditching. Search rescue procedures were initiated immediately. The helicopter was not found."

Analysis: "The pilot was informed of the marginal weather prior to departure from the first LZ. The aircraft departed with approximately 800 pounds of fuel. There was no evidence that it was refueled. Prior to departure from the second LZ, the pilot was again advised of marginal weather. The aircraft was not transponder equipped. No evidence was found in the historical records to indicate a transponder was ever installed. ADF on aircraft did not operate in compass position. The aircraft was FM equipped and had FM homing equipment on board. The pilot mentioned that he had FM homing capability. However, no evidence could be found that he ever attempted to use it.

"Since the pilot had not planned on overwater flight, no water survival equipment was aboard. The aircraft was equipped with a jungle survival kit and URC-10 radio. This is standard equipment for each aircraft in the battalion.

"The pilot went IFR low level along the coast. He continued into the weather rather than attempt to make a 180° turn out of it. After the aircraft was IFR, it is evident that he relied entirely on radar to pick them up. This is evidenced by his going back to guard and requesting radar or DF steers, after being in contact with other stations that had radar. Radar was unable to paint the aircraft due to the amount of weather clutter on the scopes. There is no evidence to indicate that the pilot attempted to get bearings using ADF loop procedures. When asked for a bearing, he stated he would call back, but did not. He came up on guard frequency and asked for assistance.

"Both the pilot and copilot had rotary wing tactical instrument tickets and there was no evidence to indicate that they had any problems controlling the aircraft in instrument conditions. There are no fixed DF facilities at any of the airfields in the area in which the lost aircraft was flying . . ."

Second indorsement to letter of transmittal: ". . . In addition to the probable or suspected cause factors, I will add the lack of command supervision. An IP stated that the copilot of this aircraft did not have the qualifications to be an aviator and that this was brought to the attention of the battalion standardization instructor pilot. They decided that nothing could be done to the man until he was involved in an accident. Nothing could be further from the truth. This man should have undergone intensive training with an IP. If, after a reasonable period of instruction, he was not proficient, he should have been grounded by the battalion commander and board action taken under the provisions of AR 106-107 . . ."

DRESSED TO LIVE

If the crewchief had not been in the proper uniform of sleeves down, visor down, and wearing gloves, his injuries would have been multiplied many times.

INVESTIGATION BOARD narrative: "The UH-1C had flown approximately 4 hours. Upon returning to the landing zone for refueling, the crew had a short wait because of many aircraft in the refueling area. When an empty point was available, the aircraft commander moved to the hose. He placed the rpm increase-decrease button in the full decrease position and rolled the throttle down to flight idle. The crewchief and gunner disconnected their rocket cannon plugs and opened both cockpit doors, sliding the protective seat armor to the rear position.

"The crewchief got the fuel nozzle, drained a small amount on the ground to make sure it was clear of foreign matter, and inserted the nozzle into the fuel cell to begin refueling. There were no static lines available. The refueling operation had been in progress approximately 2 minutes and approximately 200 pounds of fuel had been pumped aboard when the crewchief pulled the nozzle part way out of the tank. Fire started at the engine exhaust and spread quickly down the side of the aircraft, engulfing the fuel cell and crewchief at the same moment . . .

"An analysis indicated that a strong wind blowing across the open fuel cell toward the engine exhaust pipe, coupled with the crewchief pulling the fuel nozzle partially out prior to shutting the nozzle off, resulted in spraying raw fuel and vapors across the hot exhaust pipe."

The UH-1 was destroyed and the crewchief was burned on the face, arms, and hands. If he had not

been dressed as he was, with sleeves down, visor down, and gloves, his injuries would have been much greater.

Board recommendations: "All crewmembers subscribe to the following during refueling operations:

"Sleeves rolled down.

"Wearing gloves.

"Wearing chest protectors or flak vests.

"Wearing flight helmets with visors in the down position.

"Before starting refueling operations, crewchief should have suitable fire extinguisher within a reasonable distance. If there is not one located at the refueling point, the aircraft extinguisher should be removed from the aircraft and placed close to refueling point.

"All aircraft be properly grounded by approved static lines prior to starting refueling procedures.

"Fuel nozzles be inserted as far as possible into fuel cell before starting fuel flow.

"Fuel nozzles remain fully inserted until given signal from assisting crewmember, pilot, or aircraft commander that a sufficient amount of fuel has been loaded.

"Once given the signal to cease refueling operations, the nozzle handle be released and given sufficient time for all excess fuel to drain out of hose before removing fuel nozzle from fuel cell.

"Fuel cell cap be replaced on fuel cell before removing ground wire from helicopter."

USED AND REUSED

OH-23F PILOT: "I preflighted and took off for a short test flight of approximately 25 minutes. During that time the aircraft flew smoothly and I made three or four approaches into a compound. All were satisfactory and that ended the test flight. I then picked up a passenger and made one short circle and a normal approach to a hover. As I eased to a hover, the cyclic stick froze in a forward and left position, causing a very hard landing on the left side, crushing the left skid. I held the stick with pressure to the right, keeping the blades away from ground contact and shut the engine down . . ."

The helicopter had major damage and the pilot sustained a minor back injury.

Investigation board findings: "Initial inspection of the cyclic controls revealed that a bolt connecting the fore and aft connecting link rod to the transmission bellcrank assembly was partially out, jamming the lateral cyclic control. The cyclic stick could be moved forward and to the left, but not to the rear and right. Interviews with the pilot and crewchief, and inspection of the maintenance records revealed that the top rod end bearing on the outboard upper cyclic control and the bottom rod end bearing on the inboard upper cyclic control were replaced. The aircraft has been test flown for replacement of rod end bearings and released for flight.

"The crewchief reused a self-locking nut when he replaced the rod end bearings. The pilot had test flown the helicopter for 25 minutes prior to this flight, but he only performed a walkaround inspection. He had not specifically checked the nut and bolt that were removed and replaced during the rod end bearing replacement."

SELF-LOCKING NUTS MUST NOT BE REUSED ON CRITICAL COMPONENTS.

LANDING ZONE RUSH HOUR

A UH-1D ENTERED a landing zone with a flight of troop lift helicopters, picked up two passengers, and took off to join the flight formation. The aircraft commander notified the mission commander of his passenger load. He was instructed to return to the LZ and pick up additional personnel. After landing, the aircraft commander advised the squadron jump CP officer that he could take six or seven personnel on board. Apparently the jump CP officer assumed that he could load an additional six personnel, because six more boarded the helicopter, bringing the total aboard to 11 personnel. Total fuel on board was 400 pounds.

The crewchief told the aircraft commander that all persons were on board. Almost simultaneously, the aircraft commander was contacted by LZ control and instructed to move or execute an immediate takeoff. He advised that he was taking off. He brought the helicopter to a hover, checked N_1 and saw 93.5-94.0 percent power. The reading was not compared to the go-no-go chart, which would have indicated that a normal takeoff should not have been attempted with the temperature at 33° C and an N_1 reading of 93.5-94.0.

The aircraft commander took off into the wind. As the helicopter passed over the edge of the LZ, he sensed a loss of rpm. It had dropped to 6000. He reduced collective and turned left. The helicopter continued to settle and the aircraft commander elected to crash land, using the remaining power and control. He decreased collective to gain additional rpm and flared to place the helicopter over his selected landing site.

Approximately 5 feet above the trees, he leveled the helicopter and applied full collective. Touchdown was level with an approximate 10-knot forward speed and a 500 foot per minute sink rate. The helicopter entered the trees with the main rotor turning and the left skid struck the ground. The skid collapsed and the main rotor hit the ground, causing the helicopter to pitch over to the right. The main rotor and tail boom section separated.

The UH-1D was a total loss. The pilot sustained

a back injury and a lacerated jaw.

Findings: "The aircraft commander elected to make a normal takeoff, knowing that the density altitude was extremely high and that his N_1 gauge indicated 93.5-94.0 percent at a stable hover. Neither he nor the pilot checked the go-no-go chart which would have indicated a no-go condition.

"The aircraft commander failed to make sure that the load did not exceed the prescribed load of three crewmembers and seven passengers.

"The aircraft commander, knowing that the density altitude was high and recognizing a high N_1 reading, failed to use existing terrain to the rear of his helicopter to ensure maximum ground effect distance and subsequent translational lift during takeoff. This particular procedure of using the maximum length of a runway or strip is more common to fixed wing operations. However, it also applies to helicopters operating at high elevations, maximum loads, and high density altitudes."

BOTTLED
CONFIDENCE

. . . the pilot's cocky attitude most probably came from overconfidence in his flying ability; It is known that confidence feeds and swells on booze

AN OH-23 PILOT not on active duty was killed when his helicopter hit a tree on a river bank and crashed during an unauthorized flight. His passenger sustained multiple fractures, cuts, and bruises.

Witness: ". . . I had been at the hangar about 30-45 minutes when the pilot and his passenger arrived. I was working on the windshield wiper of my car and the passenger began to help me. The pilot began to polish his automobile.

"Later, I went to get parts for my automobile and they rode with me. We stopped at a barbeque place, ate a sandwich, and had one beer apiece. We then picked up the parts I needed and returned to the hangar. We spent the rest of the time I was with them repairing my windshield wipers and working on the front wheels of my car.

"I had part of a pint of whiskey and during the afternoon we each had two small drinks. This was all of the alcohol consumed by any of us during this period.

"At approximately 1630 I left for home . . . During the afternoon there had been no mention of flying or any indication that they were planning to fly."

Witness: "I got there about 1530 and sat a long time. I saw them leave . . . They came back about 1630 and pulled in beside me on the shoulder of the road in front of the hangar. The pilot asked me what I was doing there. He told me he was a security officer and just checking to see what I was doing there. I told him I was waiting for my boyfriend. He asked me who he was and what unit he was in. I told him. He said he was over him and my boyfriend was one of his problems . . .

"He said my boyfriend had asked him to keep an eye on me. I didn't believe that because I had never heard my boyfriend mention him. He said I had better go on because he wasn't coming. I told him that he was and that I had just talked with him. He repeated that he wasn't coming. I asked why and he said he wasn't supposed to be coming in . . .

"He asked me to go off with him. I told him I couldn't . . . He said I shouldn't be parked on the road, that I should pull in and park. I told him I couldn't because the sign said military vehicles only. He said if I parked in there nobody would say anything to me. He said, 'Why don't you park by the green trucks. You look conspicuous here.' I pulled in beside the green trucks and he pulled in and parked on the other side of the trucks.

"He and the other man got out of the car and I

got out of my car. I walked around to the front of the trucks and told him my boyfriend wouldn't be able to see me where I was parked. He said that he would. They walked into the building and I went back to my car.

"In a few minutes he came back and got in my car. This was about 1715. I backed my car around so my boyfriend would be able to see me. He asked what I had been doing while my boyfriend was gone. I told him that I was working as a secretary. He said that if I would come out and be his secretary for a week that he would forget all about my boyfriend coming in. I told him I couldn't do that. He said he'd have to see about getting him on active duty. I told him he just couldn't do that. He said I'd have to come along and be his secretary for a week.

"I didn't know he was drinking, but when he got into the car I could smell it. He said I could come out on weekends. I said no. He said he'd just have to get my boyfriend in trouble. It wasn't long after that until my boyfriend drove up . . ."

Witness: "I was on duty as bartender . . . I served the passenger a drink in a paper cup to take out at approximately 1730 . . ."

Witness: "I arrived at the hangar at approximately 1745 to meet my girlfriend. She was parked in the drive entrance to the hangar. The pilot asked to see my pass. I told him I had forgotten it. He told me that he would have to turn me in. Both men appeared to be drinking very heavy. The smell of liquor was very strong and both were using profanity. As I started to leave, he patted me on the back and said to go on and have a good time. After I left the field with my girlfriend, she started crying. I asked her what was wrong and she told me she had been insulted by the pilot . . ."

Passenger: "The pilot and I arrived at the hangar about 1200. After a few minutes, we went out and had lunch . . . I was with the pilot all day and there was no drinking. I was wearing a shop uniform. I don't remember what the pilot had on. The purpose of the flight was to see if the helicopter needed plugs. I filled it with gas prior to taking off. I don't think the pilot fastened his shoulder harness, but mine was on. We took off and went over a large field near the river. The helicopter was operating normally except it did have a chatter on the right mag. We were flying at about 200 feet and the helicopter shuddered. I couldn't move and I remember calling to the pilot, but he didn't answer . . ."

Flight surgeon: ". . . The blood alcohol level of the pilot was 0.215mg% and the passenger had a blood alcohol level of 0.09mg% . . .

"Shoulder harness was not worn by the pilot. This caused him to be thrown forward with resulting unconsciousness and obstruction of his airway by compressing his neck on the left door frame. I believe that the passenger was wearing his shoulder harness due to his statement to that effect and due to the fact that there was structural damage to the firewall, at the point at which the passenger shoulder harness exits, as if the inertia reel had locked and there was a side pulling force, causing the shoulder strap to wedge itself in the firewall.

"Both the pilot and passenger were wearing short sleeve shirts, cotton pants, low quarter shoes, and no gloves. Multiple abrasions and lacerations were sustained due to the lack of proper clothing.

"Helmets were lost by both pilot and passenger, probably due to failure to snap chin straps. . . ."

This was the fourth major accident for this pilot in slightly over 4 years and 1,700 hours of flying. If there was a common denominator in these four accidents, it would most likely be labeled *overconfidence.* After his third accident which occurred 13 months before he was killed, the following letter was sent to him by the division CO:

"As directed by the CG, the following flying restrictions are implemented effective this date.

"Performance of flying duties to be accomplished ONLY as prescribed and indicated below:

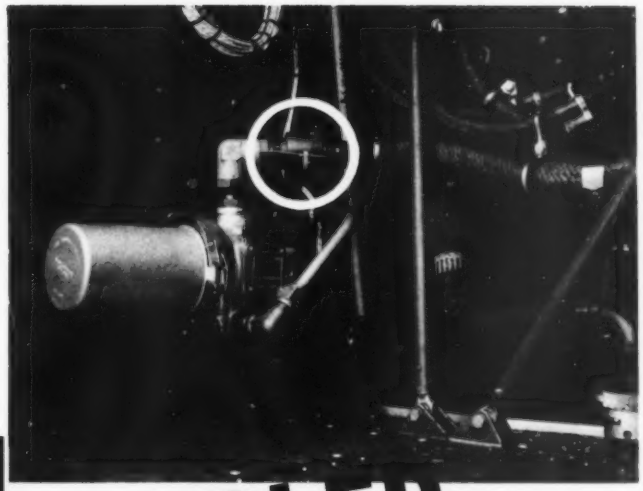
"Training flights may be accomplished during the periods of scheduled training assemblies and/or scheduled additional flight training periods.

"Proficiency flights at times other than that indicated to be authorized only at the discretion of the flight activity commander and/or flight standardization officer.

"Failure to comply with these restrictions will result in immediate suspension from flight status."

Other than his accident record, the circumstances that resulted in this letter are unknown. However, his lack of regard for rules and regulations was apparent in his failure to wear prescribed flight clothing; failure to use shoulder harness; failure to observe flight restrictions; flying while intoxicated; failure to obtain a clearance and file a flight plan; and his cocky attitude. This attitude most probably came from overconfidence in his flying ability. It is well known that confidence feeds and swells on booze.

Medical authorities say the average person is uncoordinated at 0.05mg% blood alcohol, largely intoxicated at 0.10mg%, and stone drunk at 0.40mg%. Death occurs at around 0.5mg% of blood alcohol. With a blood alcohol level of 0.215mg% this aviator had a fatal dose of bottled confidence.



Correctly installed and safetied fuel quick disconnect coupling

UNCOUPLED

UH-1D AIRCRAFT COMMANDER: ". . . The flight cranked up and took off in V formations of three. I was in aircraft number five, on the left of the formation. The flight was up and joined at about 300 feet when I saw the rpm starting to drop. We were climbing at an airspeed of 40-50 knots.

"I reduced collective, thinking I was in aircraft number four's rotorwash, but noticed the rpm still rapidly decreasing. I entered autorotation and started a left turn. With the rpm steadily decreasing, I realized that I could not regain rpm and attempted to slow the aircraft down.

"At approximately 15 feet, I pulled pitch, attempting to decrease our rate of descent. This had no effect, so I leveled the aircraft and attempted to touch down in the muddy rice paddy, feeling that the mud would have a cushioning effect. Prior to touchdown, I saw the N_1 tachometer reading 60%. After initial impact in the mud, the aircraft came to a level stop.

"The crewchief attempted to open my door while I shut off the fuel main and battery switches. He was unable to get the door open so I climbed over the console and exited through the right cargo door."

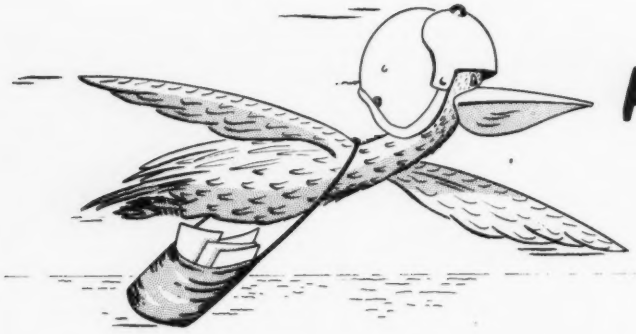
The aircraft commander sustained a back injury and damages to the helicopter totaled $99,000.

Investigation board narrative: ". . . The aircraft commander failed to recognize the loss of power immediately and did not enter autorotation until the rpm had decreased considerably. He started the autorotation at low airspeed, low rpm, and low altitude, and was unable to regain a safe, controlled flight condition. The helicopter hit extremely hard in the muddy rice paddy and slid approximately 75 feet before coming to a stop.

"Investigation of the wreckage revealed that the fuel line quick disconnect coupling at the main fuel filter was neither properly seated nor safetied. As a result, the quick disconnect coupling backed off and the loss of power was caused by fuel starvation.

"Further investigation showed the aircraft underwent an intermediate inspection the day before the accident. The faulty condition of the quick disconnect probably resulted from handling while replacing the main fuel filter during this inspection. The low altitude, low airspeed turn which forced the aircraft into an unsafe, marginal flight condition is a factor. Since questioning personnel from the company revealed this as normal procedure for the company, this factor must be considered supervisory error. Also contributing to the situation was the aircraft commander's hesitation in starting the autorotation."

Second indorsement to letter of transmittal: ". . . The pilot did not perform a comprehensive preflight to determine that the fuel disconnect was properly seated."



ARE YOU BOUND FOR RVN?

ON 1 NOVEMBER 1967 the U. S. Army Aviation School began distribution of an information packet designed for aviation personnel on orders to the Republic of Vietnam. The availability of this packet was publicized in the October issue of this magazine. Since that time more than 2,000 of these packets have been distributed both to personnel en route to Vietnam and to personnel already there. For those of you who may have missed the October issue of the DIGEST, here's what the packet is all about.

It is designed around three aviation MOS groups: type A for aviators and NCOs, type M for maintenance personnel, and type O for flight operations specialists.

The type A packet is for all aviators, and E-9, -8, -7, and -6 enlisted aviation personnel. Each type A packet includes:

1. The booklet Common Subjects and Reference Data for Army Aviation in the Field Army, which is updated annually. This booklet, containing more than 400 pages, presents the missions, organizations, capabilities, major items of equipment, and concepts of employment of Army aviation units in a type field Army.

2. A two-color map of the Republic of South Vietnam showing the corps tactical zones, U. S. Army flight following facilities, USAF tactical radar facilities and their coverage, the Decca chain and its coverage, airfields, etc.

3. An Equipment Records Guide, which is a pocket reference of the TAERS forms used in maintaining equipment found in the typical aviation company.

4. Numbered newsletters of recent RVN developments, especially oriented to Army aviation areas of interest. The news items are informally presented.

The type M packet is for EM with a maintenance MOS. It includes items 3 and 4 only.

The type O packet is for EM with a flight operations or air traffic control MOS. It includes items 2 and 4 only.

Before deciding whether you need to submit the order blank at the bottom of the page for your copy of the packet, answer these questions:

Have I received orders to take a USAAVNS course en route to RVN? If you have, don't use the blank. You will get your copy of the packet while in school.

Am I commanding an aviation unit? Am I to go to RVN as a member of an aviation unit? If you command the unit, write a letter to USAAVNS requesting the number of each type packet (A, M, and O) required by your unit. If you are a member of the unit, you'll get your copy from your CO.

If you can't expect to get your copy of the packet through these means, fill out the order blank and mail it. Be sure to notice that the type A packet includes material in the other two (M and O).

After you receive your packet and have had time to look it over, we would appreciate any comments and/or recommendations you may have that might enable us to improve it.

TO: COMMANDANT
US ARMY AVIATION SCHOOL
ATTN: AASPI
FORT RUCKER, ALABAMA 36360

REQUEST ONE COPY OF THE AVIATION RVN ORIENTATION PACKET (TYPE SHOWN BELOW) BE SENT TO THE ADDRESS BELOW, WHERE I EXPECT TO BE UNTIL _____ (DATE).

GRADE _____ FULL NAME (PRINT) _____

MAILING ADDRESS _____

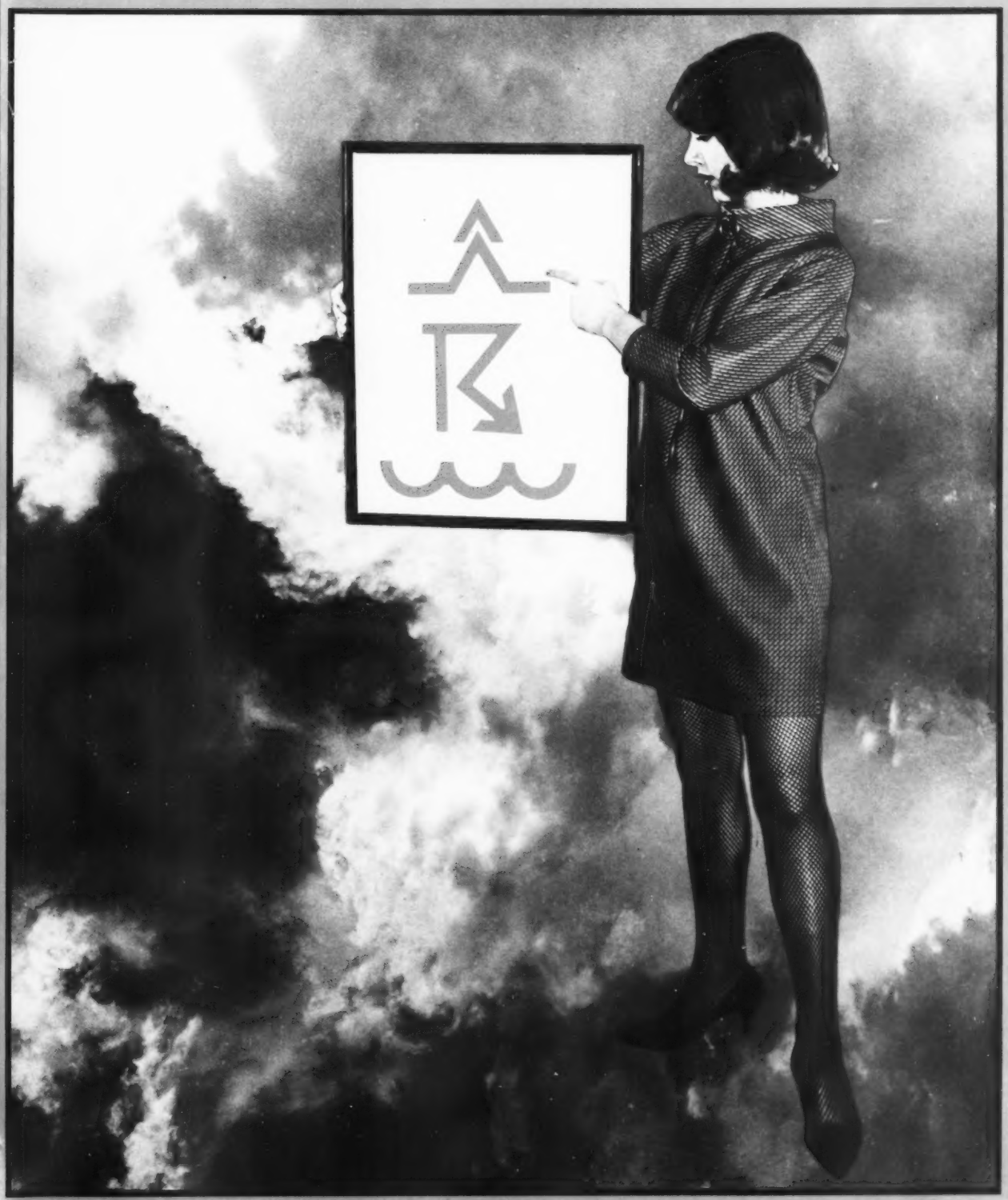
ZIP CODE _____

CHECK TYPE PACKET DESIRED: ☐ TYPE A: AVIATOR OR E9, 8, 7 OR 6.

☐ TYPE M: EM MAINTENANCE MOS's, FOR ☐ 67 A THRU Z OR ☐ 68 A THRU Z.

☐ TYPE O: EM FLIGHT OR ATC OPERATIONS MOS's, FOR ☐ 93B OR ☐ 93D OR ☐ 71P.

SIGNATURE _____

ASSIGNMENT _____
(IF NOT IN ABOVE ADDRESS)

SUMMER FORECAST